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INVESTIGATION INTO THE CHALLENGES FACING THE IMPLEMENTATION OF SCIENCE EDUCATION CURRICULUM IN THE COLLEGES OF EDUCATION IN GHANA

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ABSTRACT

The study investigated the challenges facing the implementation of the Science Education Curriculum in the 18 Science and Mathematics Colleges of Education in Ghana. The purpose of the study was to determine whether the tutors implementing the curriculum are professionally qualified or not. It was also to investigate the challenges facing the implementation process. The study employed a survey research design and randomly sampled 100 Science Tutors from the 18 science and mathematics colleges of education in Ghana. A questionnaire on Challenges Facing Curriculum Implementation in Ghana (CFCIG) with a reliability coefficient of 0.72 and a structured interview guide were used to elicit responses from the sampled tutors. The interview guide was used to obtained information on tutor and technician qualifications in order to ascertain the caliber of tutors and technicians implementing the new curriculum. The data collected were analyzed using statistical tools such as histogram plots, means, standard deviation imbedded in the IBM-SPSS software. The study revealed that 92% of the Tutors are professionally qualified to implement the curriculum in the science Colleges while 88% of the laboratory technicians were not qualified to work as laboratory technicians in the science laboratories. The study highlighted lack of in-service training and poor conditions of service of science tutors, absence of qualified laboratory technicians to work in the science laboratories and overgrowing class sizes among others as the challenges facing the standard based curriculum. It was recommended that the government as well as stakeholders should provide the necessary infrastructure and human resources needed to make the implementation of the science curriculum a success.

Key Words*: Implementation, Curriculum, Challenges, Science and Mathematics Colleges of Education, Science Tutors and academic Qualification.*

INTRODUCTION

1.1 Research background

Literature continues to devote a lot of attention to topics related to teacher education. The idea that instructors have a considerable impact on students' learning results, especially those from disadvantaged and marginalized neighborhoods, has been one of the main causes of this. Such outcomes depend on the effectiveness and quality of the educational system (Archibald, 2006; Darling-Hammond & Baratz-Snowden, 2005). As a result, we contend that a country's educational system acts as a mirror through which the vision for its future can be viewed and molded because the country's workforce is drawn from its educational institutions.

It might not be too difficult to comprehend the reasoning behind the recent changes to teacher education made in the country. In Ghana, programs for pre-tertiary teacher education are intended to "prepare teachers to enable them to function in the basic and second cycle schools as well as to develop and nurture them to become reflective and proficient practitioners capable of providing quality education for Ghanaian students" (Ministry of Education [MOE], 2012, p. 8). This assertion, along with a few others stated previously, triggered a number of reforms in teacher education institutions tasked with developing teachers for the early grades to senior high school levels, including curriculum adjustments and institution-wide reorganization.

Despite numerous reforms to teacher education, the quality of teaching and learning in Ghana is still subpar for a number of reasons, including a lack of policy coherence and a discrepancy between expectations outlined in official policy documents and what is practical within a constrained school system, among others. (MoE).

Science education involves the development and discipline of a person's mind and other faculties so that they can use science to better their lives, cope with a world that is becoming more technological, pursue science academically and professionally, and act responsibly when dealing with issues that are related to science and society (Akpan, 1992). The first African nation south of the Sahara to achieve independence from colonial authority was Ghana, formerly known as the Gold Coast, in 1957.
Curriculum implementation describes the process of putting curriculum specialists' and subject-matter experts' ideas into practice in a classroom or educational setting. While students, parents, and school officials may participate directly or indirectly in the implementation process, teachers are generally responsible for putting the curriculum into practice.

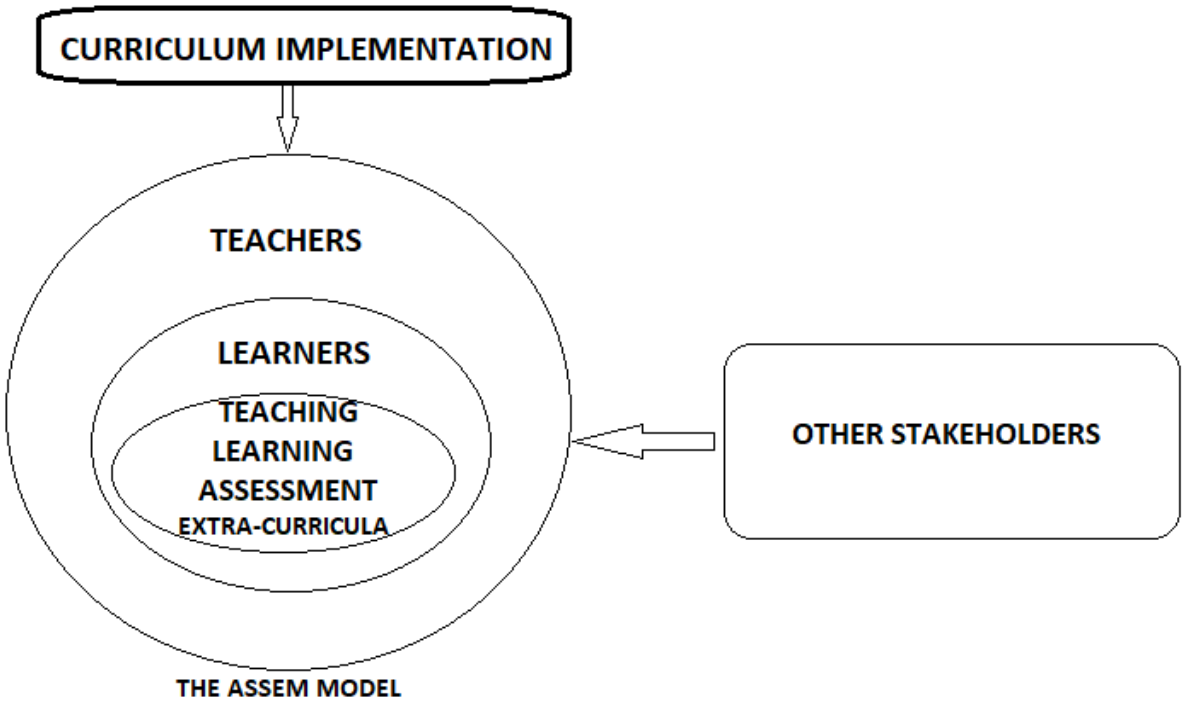

Figure 1: Main stakes of the curriculum implementation process

Ghana as a developing country must incorporate science, technology, and innovation into its economic and developmental strategies so as to accelerate its progress of development. “There is no doubt that science education is central to the lives of all citizens in the world. Presently, we live in a complex world and scientific knowledge has become so critical and crucial in making sense of all the complexities of the world. A Professor of Science Education at the Department of Science and Mathematics Education and a former Vice Chancellor of University of Cape Coast, Prof. Joseph Ghartey Ampiah, expressed these sentiments when he delivered an inaugural lecture on the topic: Pre-Tertiary Science Education in Ghana: Curriculum, Teaching, Resources and Students’ Performance. Prof. Ghartey Ampiah who has about 29 years of experience as a professional teacher intimated that Science and technology, therefore, have become major cultural products of human history, and all citizens, irrespective of their occupational needs, should be acquainted with them as elements of human culture. He added that attempts to delineate what aspects of science are important for all students to learn and what should be studied beyond basic science literacy, which will be beneficial to students who will not go on to offer careers in science have proved elusive to curriculum developers in many countries including Ghana. Many researchers have acknowledged that the quality of science teaching and learning could be affected by many factors including content knowledge and pedagogical skills of the teacher due to poor teacher preparation, inadequate, and inappropriate instructional materials, medium of instruction, lack of effective supervision and monitoring at school, lack of motivation for teachers, and inadequate number of qualified teachers to fill empty classrooms, poor attitude, and interest of learners, lack of practical activities among others (Anamuah-Mensah *et al*., 2017; Fredua-Kwarteng & Ahia, 2005; Ngman-wara 2015; Parker, 2004; Hill *et al*., 2005). However, the way and manner the science curriculum is implemented are as important as any of the challenges mentioned above. In any case, the challenges mentioned are all curriculum implementation issues which when not addressed have a very high potential of defeating the purpose for which the curriculum was drafted. This is because students have to comprehend scientific concepts taught and engage in hands-on activities, critical thinking, and problem-solving in the teaching and learning of the subject. Science education in the Colleges of Education is meant to equip beginning teachers to have a fair grip of the basic science they will be teaching in the basic schools to help the learners develop an interest in science as well as solve basic problems in their homes as spelt out in the subject aims of the basic school science curriculum (NaCCA, 2019).
The report in 2002 expanded Universal Basic Education to include two years of kindergarten. The 2007, 2019 educational reforms placed much emphasis on the study of science right from the kindergarten level by incorporating Science concepts into the Environmental Studies syllabus (Government of Ghana, 2002, 2019). With particular reference to science education, the reforms absorbed the Environmental Studies, which was taught at the Lower Primary into the Kindergarten curriculum and replaced it with Natural Science. Integrated Science was introduced at the Upper Primary (basic 4 to basic 6) and the Junior High School now basic 7 to basic 10 levels respectively. Curriculum innovations present enormous challenges to teachers who have to quickly adjust to the new content of the curriculum, instructional approaches, materials as well as assessment strategies. The introduction of Natural Science in the Science curriculum reform in 2007 replaced the Environmental Studies at basic one to three. This has a number of implications for teachers. Most teachers at the lower primary are classroom teachers who teach all the subjects in the class. They are mostly generalist teachers from the Colleges of Education who may not be conversant with the Natural Science content. In other words, most teachers at the lower primary level are not specialist Science teachers. This will therefore pose a major challenge to teachers and they will have to learn the content of science and adjust to the teaching approaches required by the curriculum. The new instructional strategies that are outlined in the curriculum mean that teachers have to significantly shift from their old ways of teaching. That is from teacher-centered instructional approaches to learner-centered approaches if the Natural Science curriculum has to be implemented in the classroom as recommended. With a standard based curriculum in operation, teachers can only be thinking of adopting instructional styles that are more student-friendly hence, pose more as facilitating

pillars in the classrooms rather than autocratic knowledge producers. Alas, the new curriculum emphasizes on the inquiry-based processes of science teaching (CRDD, 2007, NaCCA, 2019). These processes are learner-centered but instructional approaches in Ghanaian Science classrooms are mostly teacher-centered as reported by Ngman-Wara, 2011; Osei, 2004. The reality is that behold! old things have passed away and new things have now taken center stage in the new curriculum. This makes it imperative for science teachers to embrace the challenge for the task ahead. Teachers are considered to have a critical role in the realization of the ideas, aims, and goals outlined in the Natural Science and Integrated Science curriculum (Isler & Cakiroglu, 2009). No matter what the curriculum suggests, it is the teacher who makes the ultimate decisions about what goes on in the classroom, so the teacher has a critical role in the implementation of the Natural Science and Integrated Science curricula. The science courses in the Colleges of Education include two Integrated Science courses in year one for all students and then special science courses made up of Physics, Chemistry, and Biology courses for elective science students from year two to year four on a semester-by-semester basis.

Effective implementation of a college science curriculum needs extra resources and support with qualified tutor base. At a time of economic recession such as that which currently exists in Ghana, the shortage of financial and human resources creates more difficulty for the implementation of the science curriculum in the Colleges of Education in Ghana. It is no doubt that Policy objectives or directives are not being met due to situations that may arise from lack of quality instructional materials, teacher motivation and perhaps unqualified human resources or manpower as well as limited material resources at the disposal of the curriculum implementors. Gidado (2001) agreed that inadequate number of qualified teachers and poorly trained teachers is another problem facing the implementation of a curriculum. In a similar argument, Black and Atkin (1996) indicated that the challenge facing African Science, Technology, and Mathematics (STM) educators is how to use existing resources to achieve their new goals. They contend that STM teachers must establish instructional routines in their classes utilizing the materials at their disposal and routines they believe are effective, cutting-edge, and imaginative ways for students to learn the material they need to succeed in school. Despite limited resources, the instructor must come up with instructional tactics that will guarantee meaningful learning. Colleges of Education in Ghana must position themselves to meet the emerging challenges of the world due to the variety of factors that influence teaching and learning, including student behavior, prerequisite knowledge, readiness for learning, social status, and availability of vocational and technical products. Teacher-trainers at all levels, including education officers and inspectors of science education, should attach themselves to urban and rural schools to obtain first-hand information and experience about these variables. Otuka (2001) believed that familiarization with the working of schools in both settings will arm them to guide the students' effectiveness rather than using the traditional approach to training trainees.

Otuka (2001) concluded that the teacher is the key; a well-trained and motivated teacher will make a difference in coping with any new curriculum. Lindsley (1990) introduced the use of precision teaching that has its roots in free-operant means; that is, "Students are free to respond at their own pace without having restraints placed on them by the limits of the materials or the instructional procedures of the teacher. Precision teaching is best described as a tool for basing educational decisions on changes in continuous self-monitored performance frequencies displayed on standard celebrations charts".

The UK team behind the Girls into Science and Technology (GIST) programme saw science teachers attempting to draw in males by portraying science as a male dominated discipline. For instance, by highlighting its hazards (Whyte, 1985). According to Odetoyinbo (2004), Hurd (1983) regarded the state of pre-college education in mathematics and science in the United States as worrying in that, children don't especially enjoy science and the disinterest in science develops early in life.

Since the Science curriculum is a new curriculum innovation introduced into the education system of Ghana in 2019, it is important to study teachers' knowledge of all aspects of the curriculum bearing in mind other challenges that may hinder the implementation of the curriculum at all levels of the initial teacher training programme.

More needs to be done to move away from antiquated ways of learning; typically, rote learning and adopting strategies that include students in high-level cognitive processes and encouraging reflection, analysis, and thought when developing curricula. This must be borne in mind knowing that a number of organizational techniques are employed while planning a curriculum with the goal of maximizing student comprehension.

Curriculum implementation is the stage in which learning activities, teachers and learners are involved in negotiations aimed at promoting learning. The teacher adopts the appropriate teaching method and materials to guide students' learning. This way, the rationale and other aims set by the curriculum is achieved with little stress. There are two components of any implementation effort that must be present to guarantee that the planned changes in curriculum and instruction succeed as intended;

Understanding the conceptual framework of the content /discipline being implemented; and organizing assistance to understand the theory, observe exemplary demonstrations, have opportunities to practice and receive coaching and feedback; focused on the most powerful instructional strategies to deliver the content at the classroom level hence, a successful curriculum implementation.

In summary, we agree with Prof. Ghartey Ampiah's assertion that all citizens, regardless of their line of work, should be familiar with science and technology. In fact, as he puts it any attempt to specify which scientific concepts should be taught and studied by every student would be counterproductive for pupils. Ghana is thus, one of the countries that evades this demand. We also believe that Anamuah-Mensah and other researchers' position that a variety of factors, such as the teacher's subject-matter expertise and pedagogical abilities as a result of inadequate teacher preparation, inadequate and inappropriate instructional materials, among others, could have an impact on the quality of science teaching and learning hence a dire consequence on the implementation of any curriculum. This relates to the reason we chose to look into the current curriculum for the colleges of education because the implementation of the science curriculum in the colleges is tied into any of the crucial difficulties mentioned above. There is no doubt that many researchers have acknowledged that lack of effective supervision and monitoring at school, lack of motivation for teachers, and inadequate number of qualified teachers to fill empty classrooms, poor attitude, and interest of learners, lack of practical activities among others have affected many curricula implementation processes. Ngman-Wara (2011) and Osei (2004) have also put forward that the majority of the teaching strategies used in Ghanaian science classrooms are teacher-centered. But must we keep using this anti-learner centered approach to achieve the sort of improvement we seek to achieve in the 21st century? The difficulty facing African Science, Technology, and Mathematics (STM) educators is how to use existing resources to meet goals of a curriculum as indicated by Black and Atkin (1996). we probably agree with them on this point. However, Gidado (2001) has also stated that a lack of competent instructors and poorly prepared teachers have been a roadblock to the adoption of many curricula. Teachers who employ the teacher-centered method are more likely to struggle with how to use the resources provided or even available in their instructional environment. we agree with Otuka (2001) that the teacher is the key; a well-trained and motivated teacher will make a difference in coping with any new curriculum.

Teachers must strive to use the resources at their disposal and routines they believe are effective, cutting-edge, and imaginative ways for students to learn the material they need to succeed in school as per the design of any curricula.

1.2 Statement of the problem

The 2007–2019 educational reforms prioritized the study of science by integrating science topics into the Environmental Studies curriculum beginning in kindergarten (Government of Ghana, 2002, 2019). It made the learning of science at the basic level a non-negotiable issue. The implementors of the curriculum that will raise teachers to teach science in the basic schools are the tutors in the 18 science and mathematics colleges of education who are also implementing the 4-year initial teacher education curriculum. This curriculum has been running for the past four years with the first batch of teachers graduating this year, 2022. It is worth noting that the implementation of the initial teacher education curriculum has been faced with a number of challenges including teacher qualification, inadequate resources, overgrowing class sizes among others which are worth investigating.

1.3 Purpose of the study

The purpose of this study was to determine whether the tutors that implement the curriculum are professionally qualified or not and to investigate other challenges facing the implementation of the new curriculum in the Colleges of Education in Ghana.

1.4 Research Questions

1. ***What are the range of qualifications of the tutors and laboratory technicians in the science and mathematics colleges of education in Ghana?***
2. What are the challenges facing the implementation of New Science Curriculum in the 18 Science and Mathematics Colleges of Education in Ghana?

1.5 Justification

In 2018, Act 847 of Ghana's educational Acts elevated Colleges of Education (CoE) into tertiary institutions from three-year institutions that awarded diplomas in basic education to four-year institutions that awarded degrees. The CoE were recognized as teacher training institutions before Act 847 was passed, and the Ghana Education Service, the organization in charge of pre-tertiary teacher education, was in charge of them. The Colleges of Education Act 2012, Act 847, was passed, giving their new elevated status legal support. Since then, the National Council for Tertiary Education has been in charge of the colleges (NCTE). The NCTE is the government agency in charge of overseeing tertiary institutions in Ghana. It worth noting that the first batch of students have passed out and are awaiting posting to undertake their national service. As a researcher and a tutor in the college of education, I think an introspection of how the new curriculum has been implemented over the last four years is needed to be carried out to ascertain the challenges if any that have otherwise bedeviled the successful implementation of the new programme hence, the call for this study.

METHODOLOGY

2.1 Research Design

The study employed a survey research design to investigate into the challenges facing the implementation of the science Curriculum in the Colleges of Education.

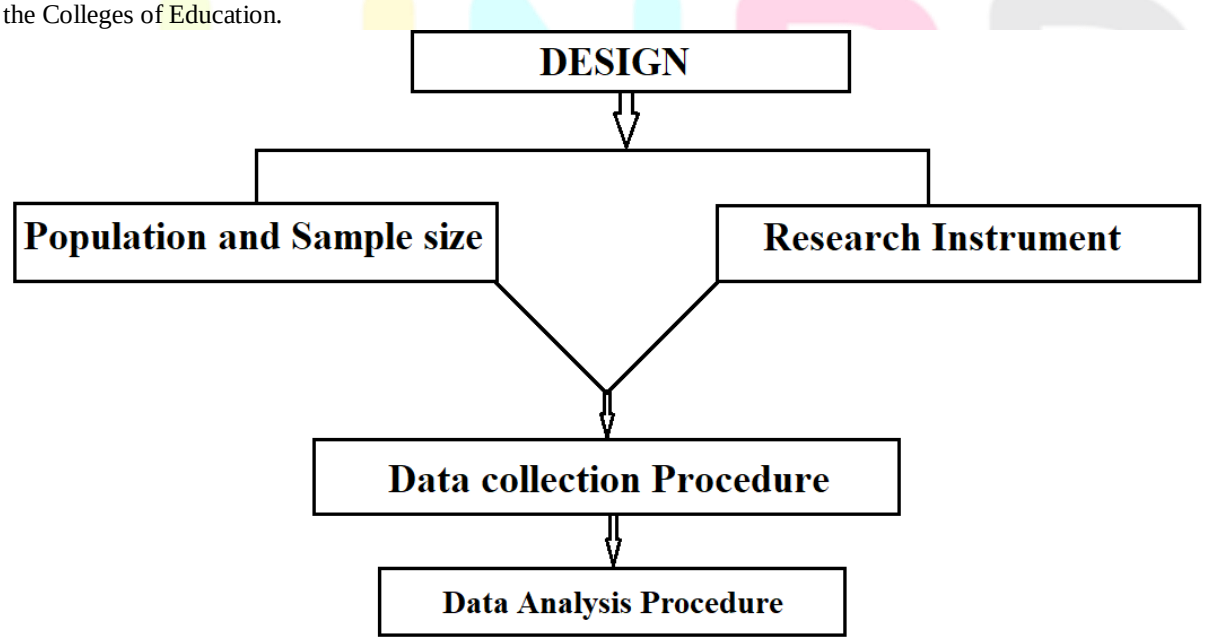

Figure 2: Research design

2.2 Population and Sample size

One hundred (100) science tutors were randomly sampled from science 140 tutors in the 18 Science and Mathematics Colleges of Education in Ghana using the random sampling technique for the study carried out in the zones of the various regions in the country. The colleges can also boost of 8 laboratory technicians with various shades of qualifications.

2.3 Research Instrument

The data obtained for this study had been collected by two instruments namely, questionnaire and a structured interview.

2.3.1: Questionnaire

A three-point Likert scale questionnaire dubbed Questionnaire on Challenges Facing Science Curriculum Implementation in Colleges (CFSCIC) was used to elicit the views of respondents for the study. The scale was ranked as Agree, Disagree and Not sure. The face and content validity of the instrument were ascertained by an evaluation expert in curriculum implementation and an experienced science and technology lecturer at University of Education, Winneba. The construct validity of the instrument was confirmed by distributing 20 copies of the questionnaire to 20 randomly selected two convergent groups from the colleges. This was followed by plotting correlation graphs of their responses to obtain a coefficient value of 0.78 on the Pearson product moment correlation. This meant that there was a stronger association between the two convergent groups in terms of the responses given. The Pearson product-moment correlation coefficient, r,

was used to assesses the strength of a linear relationship between two variables in this case the responses from the two convergent groups. The distance between all of these data points and the line of best fit that a Pearson product-moment correlation tries to construct over the data of two variables is represented by r. Also, the interpretation is done by using the guideline below which was used to determine how valid the CFSCIC was:

	Coefficient, r	
Strength of Association	**Positive**	**Negative**
Small	0.1 to .3	-0.1 to -0.3
Medium	0.3 to .5	-0.3 to -0.5
Large	0.5 to 1.0	-0.5 to -1.0

The reliability of the instrument was confirmed by distributing 20 copies of the questionnaire to respondents who were not part of the study's sample. Cronbach alpha, credited to Cronbach (1951), was used to assess the instrument's consistency and has a reliability coefficient of 0.72.

2.3.2: Structured interview

This instrument was used to elicit responses from tutors and laboratory technicians on the qualifications they possessed in the colleges. It was also used to probe into the choices they made on the CFSCIC Questionnaire.

2.4 Data Collection Procedure

The CFSCIC was administered on the selected respondents in the 18 Science and Mathematics Colleges of Education in Ghana. This was done using zonal representatives.

2.5 Data Analysis Procedure

The data collected were analyzed using appropriate descriptive statistics from the IBM-SPSS software and these range frequency counts, percentage, mean, histogram plots and standard deviation among others. The research questions raised were answered using descriptive statistics including percentages and graphs of histograms, bar charts and pie charts.

3.1 RESULTS AND DISCUSSION

The results obtained in the survey has been analyzed based on the research questions as shown below.

Research question one

What are the range of qualifications of the tutors and laboratory technicians in the Science and Mathematics Colleges of Education in Ghana?

To address the above question, tables 1 and 2 below were used:

TABLE 1: FREQUENCY DISTRIBUTION OF SCIENCE TUTORS' QUALIFICATIONS

Certificate	Number of Tutors	**PERCENTAGE (%)**
PhD	8	**6**
MPhil	50	**36**
M.Ed	70	**50**
Bachelor	12	**8**
Total	140	**100**

From table 1 above, 8 tutors representing 6% possess doctorate degree in their chosen fields. 50 tutors representing 36% have master of philosophy degree in their various special fields of endeavour. Again, 70 tutors constituting 50% possess master of education degree in their area of study while 12 tutors representing 8% have bachelor degree in their chosen fields. This has been represented on the pie chart below, Figure 3.

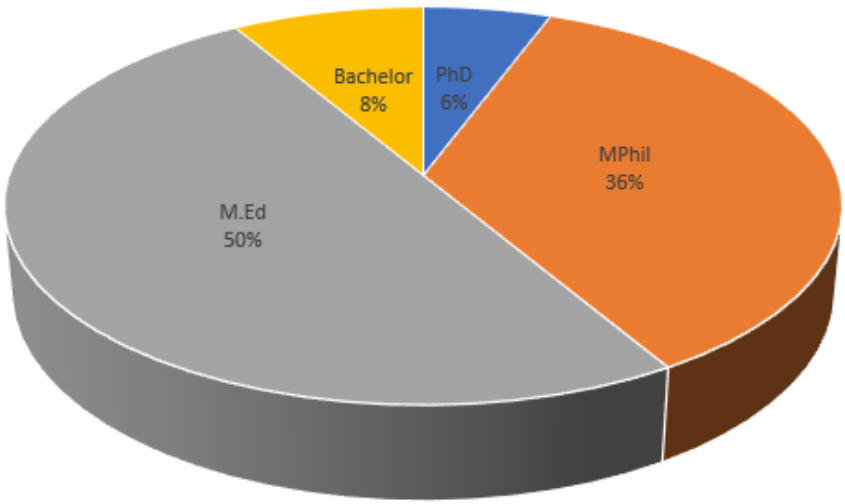

Figure 3: Pie chart representing qualification of science tutors in the 18 colleges

Table 2: Qualifications of Lab Technicians and technical instructors

Certificate	N0 of Lab Technicians	Percentage (%)
BACHELOR	**1**	**12**
HND	**4**	**50**
DIPLOMA	**3**	**38**
TOTAL	**8**	**100**

Table 2 presents the categories of Laboratory technicians in the 18 Science and Mathematics Colleges of Education in Ghana. It can be observed that the highest qualification of laboratory technicians is the Bachelor degree in laboratory technology of which only one person has this qualification; a percentage of 12. Also, 4 laboratory technicians representing 50% have the higher national diploma (HND). Furthermore 3 out of the 8 laboratory technicians constituting 38% have ordinary diploma in laboratory technology and were mostly doing their national service. The summary of this is represented on the bar chart below (figure 4)

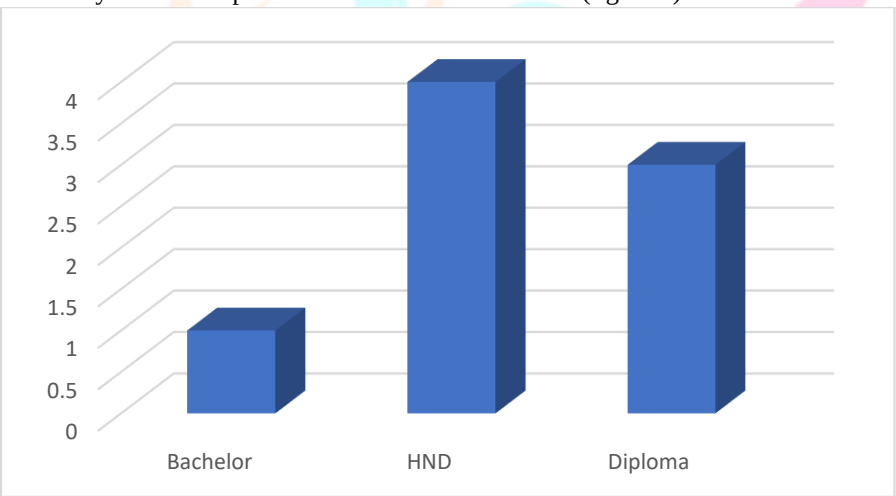

Figure 4: Pie chart showing qualification of laboratory technicians

Research Question two

What are the challenges facing the implementation of New Science Curriculum in the 18 Science and Mathematics Colleges of Education in Ghana?

In an attempt to address the above question table 3 below was used:

Table 3: Challenges facing the implementation of the New Curriculum for Colleges of education

Item N0	Statement
1	Inadequate Resources
2	Lack of in-service training and poor condition of service affect my efficiency
3	Lack of qualified laboratory technicians to handle the laboratories in the colleges
4	Lack of standard workshop for practical work to complement the theoretical aspect of the new modules
5	Undefined boundaries of course materials and manuals
6	Over-growing class size
7	Lack of supervision
8	Unstable academic calendar due to triple track system in the colleges
9	A busy college time-table
10	Supported teaching in schools (STS) takes larger portion of teaching, learning and assessment credit hours.

Table 4: Statistics of challenges facing the implementation of the new curriculum

		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
N	Valid	100	100	100	100	100	100	100	100	100	100
	Missing	2	2	2	2	2	2	2	2	2	2
Mean		1.76	1.60	1.63	1.30	1.29	1.15	1.95	1.06	1.27	1.18
Std. Error of Mean		.078	.074	.084	.054	.061	.046	.076	.031	.055	.044
Std. Deviation		.780	.739	.837	.541	.608	.458	.757	.312	.548	.435
Variance		.608	.545	.700	.293	.370	.210	.573	.097	.300	.189
Skewness		.451	.798	.792	1.638	1.960	3.150	.084	5.510	1.941	2.410
Std. Error of Skewness		.241	.241	.241	.241	.241	.241	.241	.241	.241	.241
Kurtosis		-1.216	-.730	-1.105	1.821	2.584	9.257	-1.236	30.742	2.869	5.384
Std. Error of Kurtosis		.478	.478	.478	.478	.478	.478	.478	.478	.478	.478
Minimum		1	1	1	1	1	1	1	1	1	1
Maximum		3	3	3	3	3	3	3	3	3	3

Table 5: Item 1(Inadequate Resources)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	45	44.1	45.0	45.0
	DISAGREE	34	33.3	34.0	79.0
	NOT SURE	21	20.6	21.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 5, illustrates respondents take on whether inadequate resources is a challenge to the successful implementation of the new curriculum at the colleges of the education. Forty-five percent (45%) of the tutors agreed that indeed inadequate resources such as ICT resources including internet data, teaching and learning materials ranging from visuals, audio-visuals, audios and realia are a hinderance to the new curriculum. They opined that these resources are all mostly classroom related and must be provided for a successful implementation of the curriculum. On the contrary, 34% of the tutors did not think this was the case. Their position was simply that the resources could only come when tutors request for them. However, 21% of the tutors could not tell whether inadequate resources posed as hinderance to the successful implementation of the new curriculum. The summary of the responses from the tutors with regards to inadequate resources has been presented in the histogram below (figure 5).

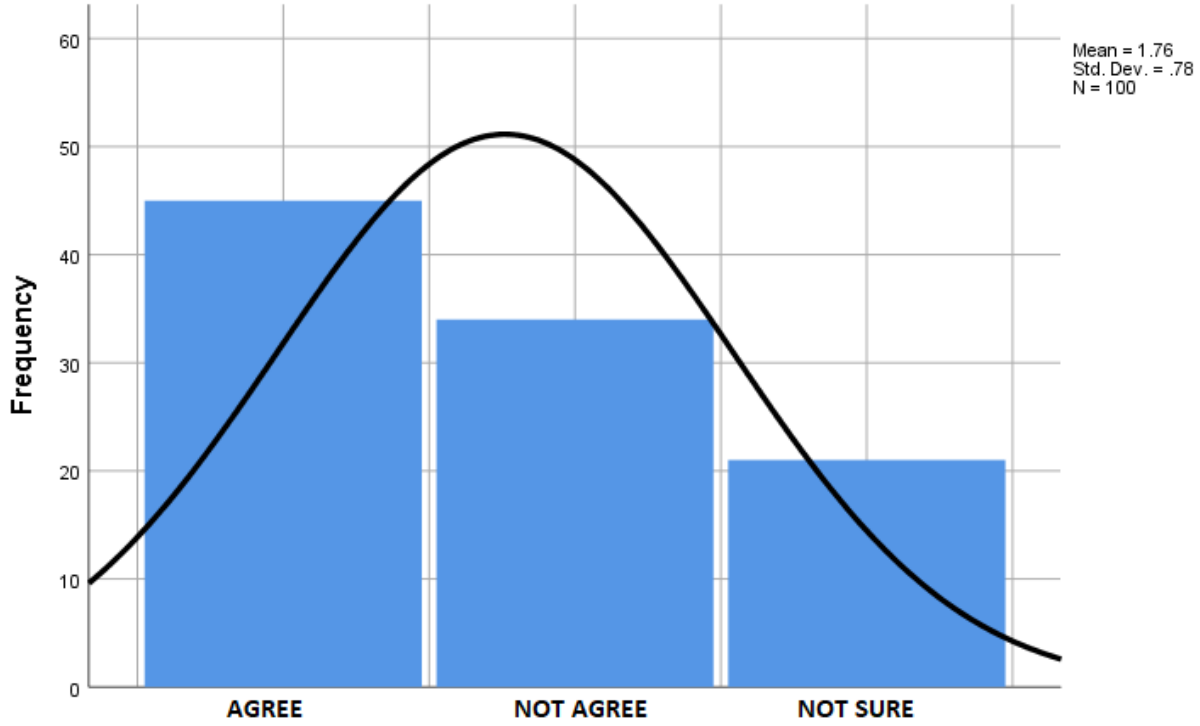

Figure 5: Histogram on Inadequate resources

Table 6: Item 2 (Lack of in-service training and poor condition of service affect my efficiency)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	55	53.9	55.0	55.0
	DISAGREE	30	29.4	30.0	85.0
	NOT SURE	15	14.7	15.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 6 presents responses of tutors on the issue of whether lack of in-service training and poor condition of service affect their efficiency in the implementation of the new curriculum. Fifty-five (55) tutors out of the sample size of 100 and also representing 55% did agree to this statement. Views sought from tutors simply suggested that tutors thought that the professional development sessions (PDS) organized were not very effective and, in most cases, did not reflect the real issues on the ground. Furthermore, 30% of the teachers had a different opinion on the issue. According to these respondents, PDS was organized for tutors to enable them have an insight into how the new curriculum was supposed to run and that was enough. Moreover, 15% of the respondents could not take positions for or against the motion under investigation. The views of the respondents on this subject matter have been graphed on the histogram below (figure 6).

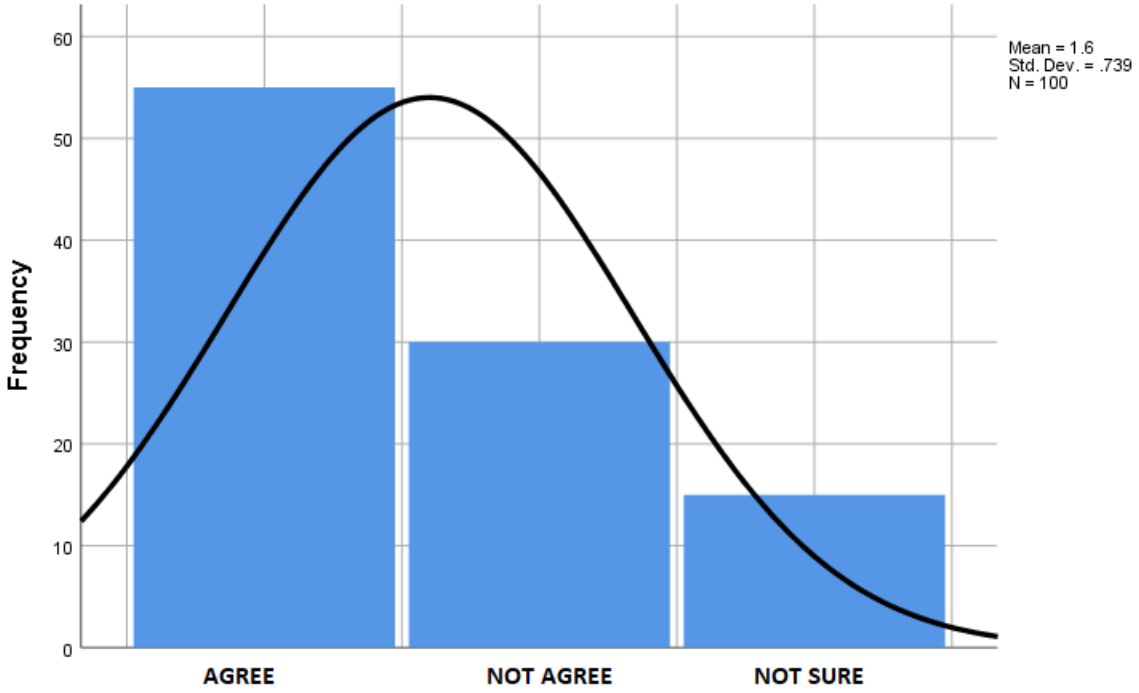

Figure 6: Histogram on lack of in-service training and poor condition of service affect my efficiency

Table 7: Item 3 (Lack of qualified laboratory technicians to handle the laboratories in the colleges)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	60	58.8	60.0	60.0
	DISAGREE	17	16.7	17.0	77.0
	NOT SURE	23	22.5	23.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 7 exposes respondents' position on whether there is lack of qualified laboratory technicians to handle the laboratories in the colleges. Majority of the respondents forming 60% agreed to the assertion. They further indicated that the available laboratory technicians do not have the requisite qualification to handle science practical in the colleges of education. A tutor said, "I doubt if there are laboratory technicians in our colleges because in my college, we do not have". Seventeen percent (17%) of the tutors disagree with the statement under consideration. Their reasons in summary suggested that most of the course materials in science did not have any practical related experiments hence, they did not find the use of the laboratory technicians in the colleges. Meanwhile, 23% of the tutors could not tell whether the statement was true or otherwise. A summary of the responses has been presented in figure 7 below.

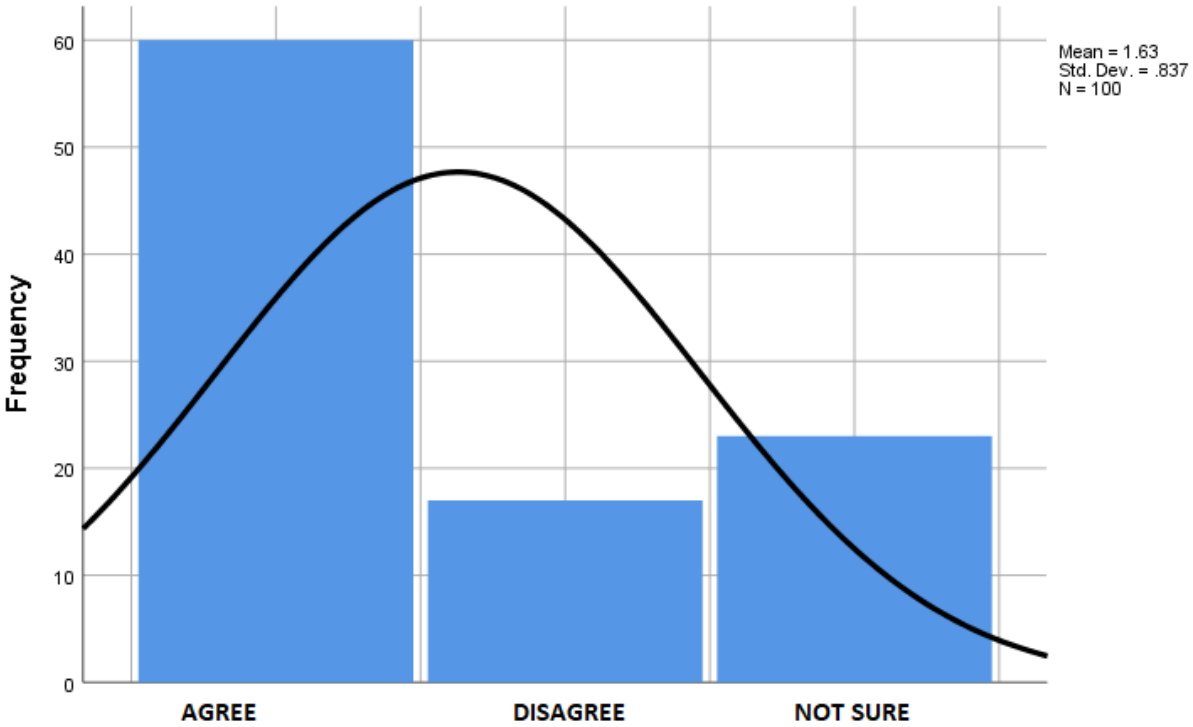

Figure 7: histogram showing Lack of qualified laboratory technicians to handle the laboratories in the colleges

Table 8: Item 4 (Lack of standard workshop for practical work to complement the theoretical aspect of the new modules)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	74	72.5	74.0	74.0
	DISAGREE	22	21.6	22.0	96.0
	NOT SURE	4	3.9	4.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 8 suggests that 74% of the respondents think that lack of standard workshop for practical work to complement the theoretical aspect of the new modules has tremendously affected the implementation of the new curriculum. They claim that the practical aspects of disciplines like science and TVET have been silent in the implementation as only a handful of practical activities have been organized to relate theory to practice. The science tutors maintained that practical science has no place in the science curriculum in some colleges that have been affiliated to the mother universities. However, 22% of the tutors disagree with this assertion. The respondents in this category though disagree with the statement opined that more need to be done because they find what has been done with regards to practice woefully inadequate. Furthermore, 4% of the respondents preferred not to take sides in the debate. The various responses have been presented in the graph below, figure 8.

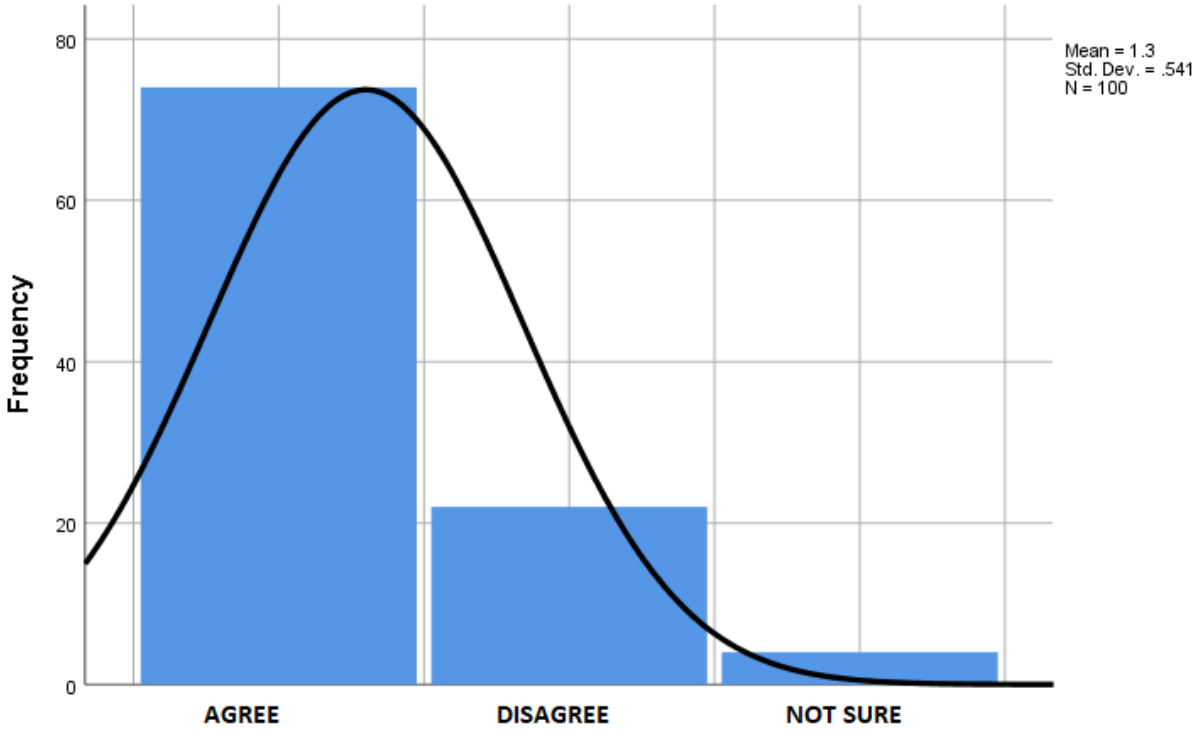

Figure 8: Histogram of lack of standard workshop for practical work to complement the theoretical aspect of the new modules

Table 9: Item 5 (Undefined boundaries of course materials and manuals)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	79	77.5	79.0	79.0
	DISAGREE	13	12.7	13.0	92.0
	NOT SURE	8	7.8	8.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 9 shows that 79% of the respondents agree with the statement that course manuals have undefined boundaries. Tutors here, claim that this condition has made teaching, learning and assessment very laborious and cumbersome. They are of the opinion that when clear boundaries are spelt out for the various course manuals, tutors and trainees will be more focused and self-motivated to achieve targets that have been set. “I don’t know where to start and where to fish” this was a statement from one of the respondents on the point under interrogation. Thirteen of the respondents (13%) argued that this was not the case. They believed that university education is universal hence, tutors should not be seeking for boundaries to course manuals in order to teach. Research, they suggested must be the way to go. Meanwhile, 8% of the tutors were not sure of which side they should belong. The summary has been presented in the histogram below, Figure 9

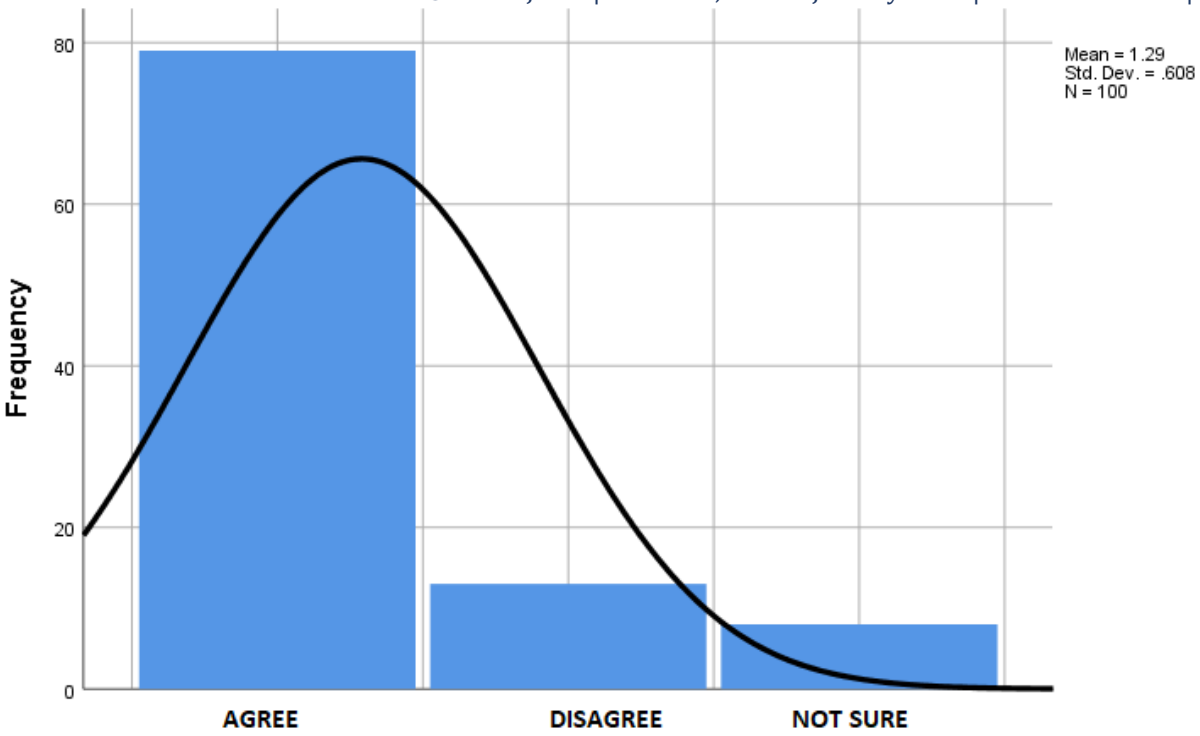

Figure 9: Undefined boundaries of course materials and manuals

Table 10: item 6 (Over-growing class size**)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	89	87.3	89.0	89.0
	DISAGREE	7	6.9	7.0	96.0
	NOT SURE	4	3.9	4.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 10 presents the responses on whether over-growing class size has posed a challenge to the new curriculum. Indeed, 89% of the respondents agreed to this as a challenge. The main reason assigned to this parameter was that, with the advent of the Free Senior High School policy in Ghana, the need for more classroom space has become a non-negotiable issue. Many students are being churned out and so more classrooms and teaching resources are needed to accommodate them. Tutors claim that there is a huge gap of infrastructure deficit making it very difficult to get all the students in the classroom and most especially in the labs at the same time. Only 7% of the respondents disagreed with the statement in question. It was also recorded that 4% of the tutors responded that they were not sure if that had really affected the implantation of the new curriculum. The summary has been recorded in the histogram below, figure 10.

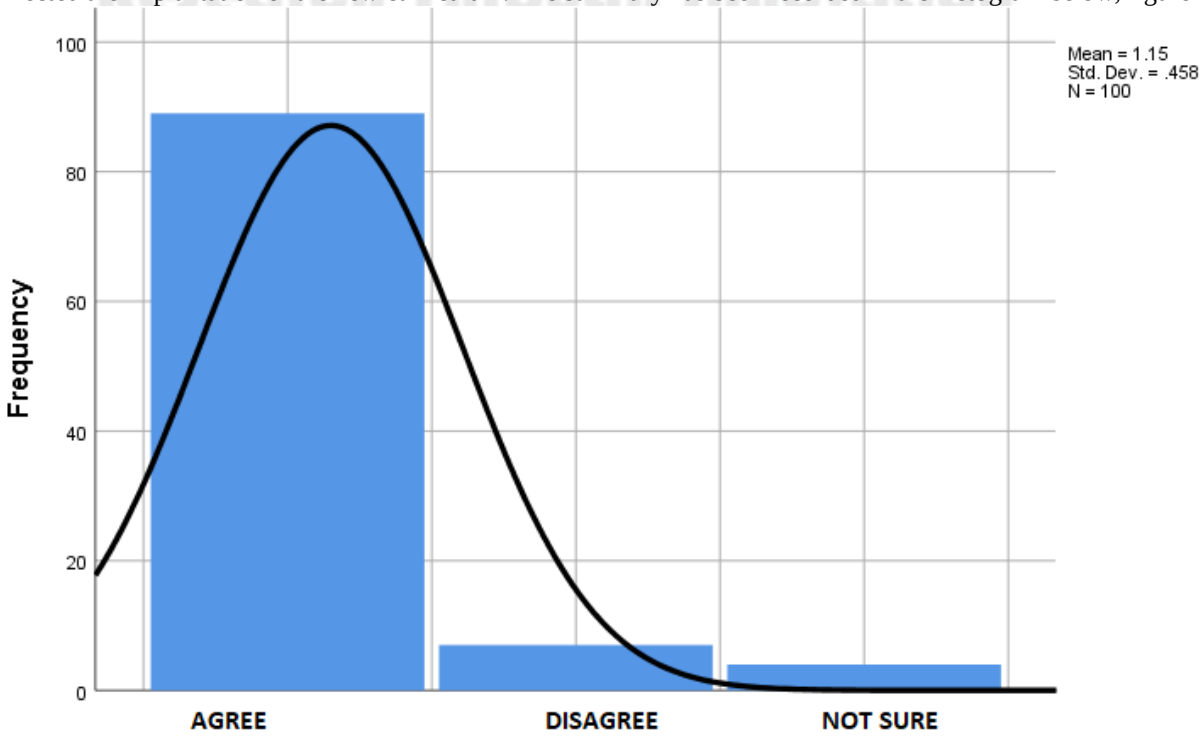

Figure 10: Histogram of **over-growing class size**

Table 11: Item 7 (Lack of supervision)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	31	30.4	31.0	31.0
	DISAGREE	43	42.2	43.0	74.0
	NOT SURE	26	25.5	26.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Tutors' responses on the issue of lack of supervision was tabled by Table 11. It came out that 31% of the tutors agreed that supervision of the new curriculum was a challenge to the implementation of the new curriculum. They opined that supervision was woefully inadequate hence the players in the teaching fraternity in the colleges have relaxed. On the contrary 43% of the tutors had it that supervision was not an issue. They believed that tutors were up to the task thus, needed no supervision to do their work. Nonetheless, 26% of the tutors could not take a stand on the point at issue. To them, they preferred to sit on the fence on the issue in point. This has been illustrated in the histogram below, figure 11.

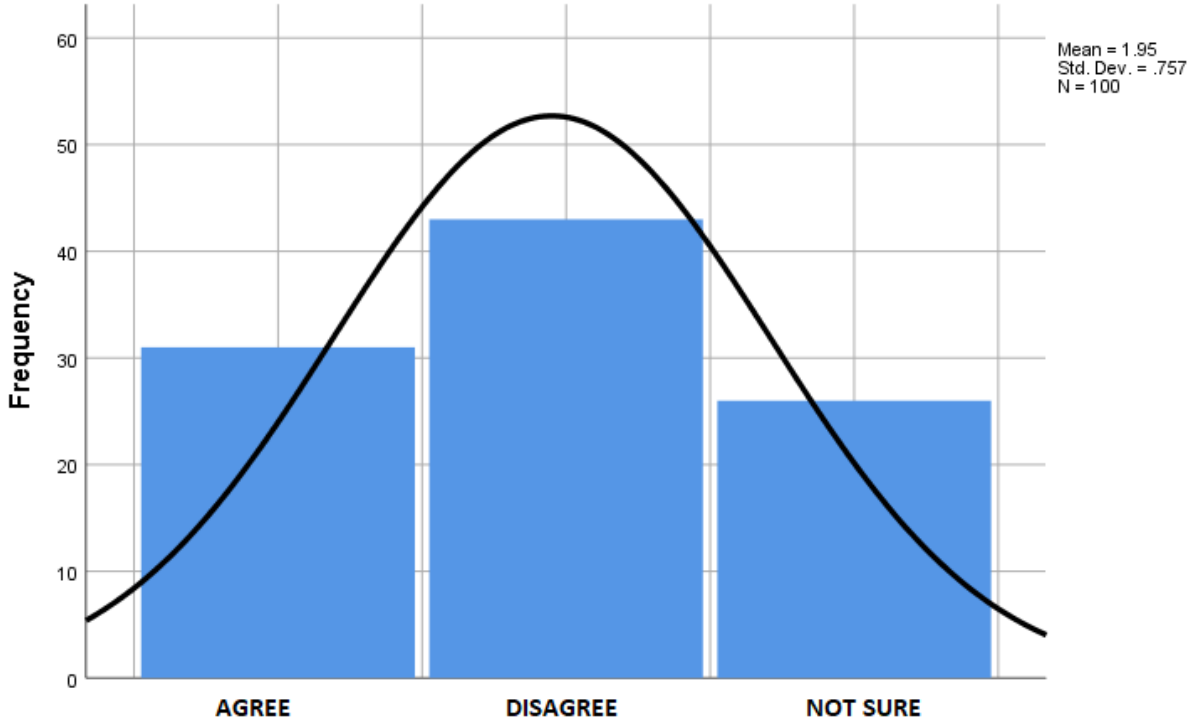

Figure 11: Histogram of lack of supervision

Table 12: Item 8 (Unstable academic calendar due to triple track system in the colleges)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	96	94.1	96.0	96.0
	DISAGREE	2	2.0	2.0	98.0
	NOT SURE	2	2.0	2.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

From Table 12, an overwhelming 96% of the respondents think that unstable academic calendar due to triple track system in the colleges in the colleges of education have played a significant role in dwindling the prospects of the new curriculum for the colleges of education. They argue that tutors are being overworked leading to various degrees of underperformance among tutors. Students go through a lot of stress to take semester course since most of the semester programmes have been run on six weeks in and six weeks out basis. A tutor suggested that the issue of teachers working all year long has affected his output in the classroom, supervision of STS activities as well as supervision of project work have also been interrupted due to parallel academic calendar with practicing schools. Another tutor indicated that the rampant strike actions by tutors have worsen the problem. Only 2% of the tutors objected to the statement under investigation. Again, 2% of the tutors did not take a stand. The positions of the respondents have been represented on the histogram in figure 12.

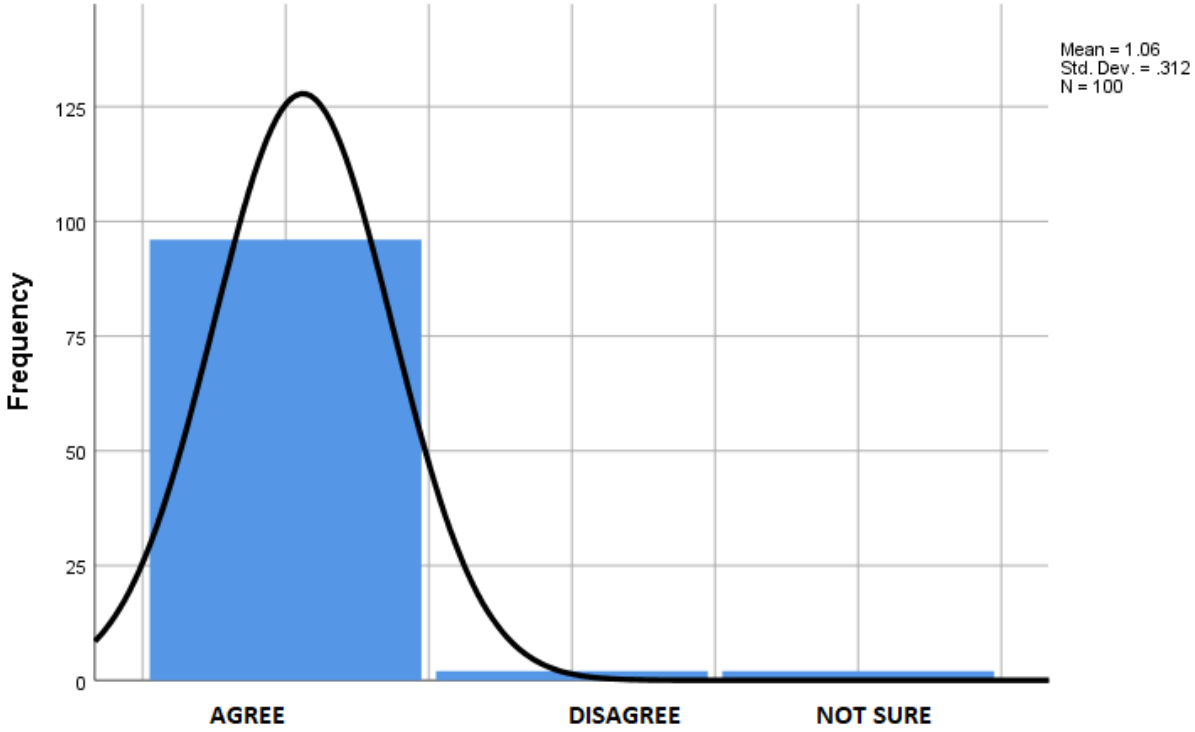

Figure 12: Histogram of u**nstable academic calendar due to triple track system in the colleges**

Table 13: Item 9 (A busy college time table)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	78	76.5	78.0	78.0
	DISAGREE	17	16.7	17.0	95.0
	NOT SURE	5	4.9	5.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 13 has revealed that 78% of the respondents agree with the assertion that busy college time table has posed a challenge to the implementation of the new curriculum in the colleges of education. The tutors in this group suggested that due to the triple track system where students do six weeks, take a break and come back to do six weeks, there has been a necessitated haphazard teaching, learning and assessment environment that has not produced student teachers in the manner that the curriculum has specified. On the other hand, 17% of the respondents disagreed with their colleagues yet, did not cite any reason for their disagreement. Five of the tutors representing 5% however did not take a stand on the issue under discussion. A summary of the responses can be accessed on the histogram in figure 13.

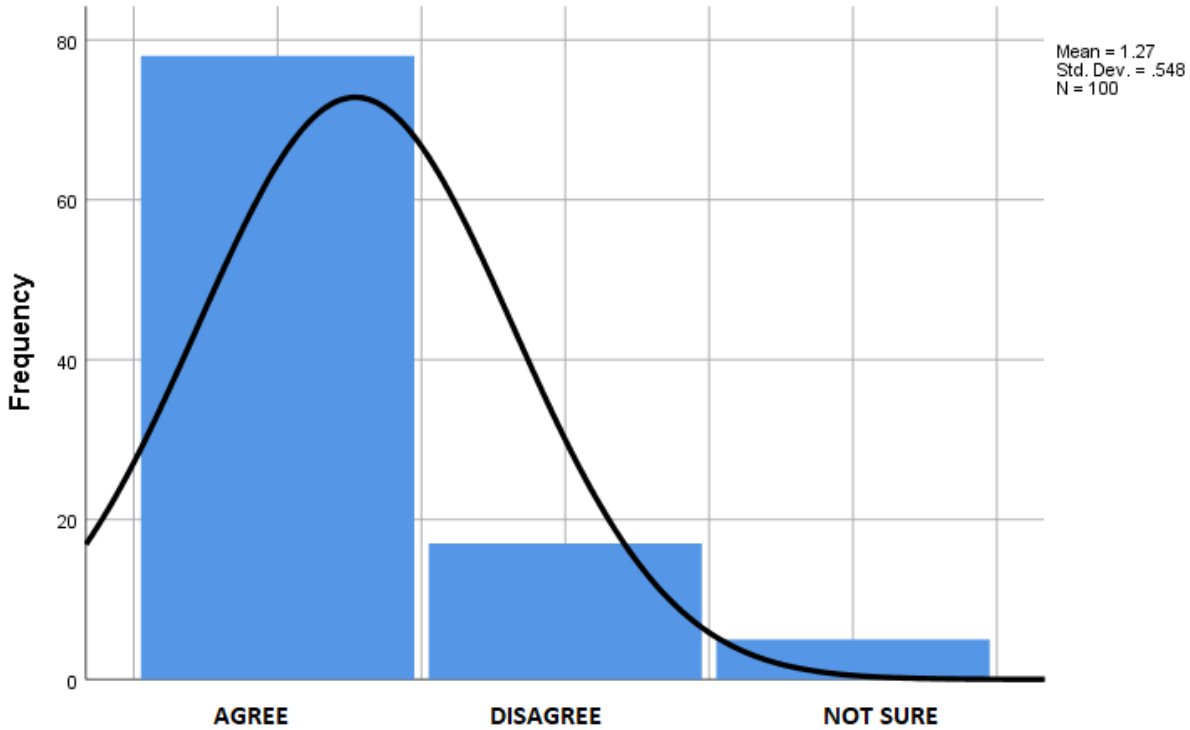

Figure 13: Histogram on **busy college time table**

Table 14: Item 10 **(**Supported teaching in schools (STS) takes larger portion of teaching, learning and assessment credit hours).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AGREE	84	82.4	84.0	84.0
	DISAGREE	14	13.7	14.0	98.0
	NOT SURE	2	2.0	2.0	100.0
	Total	100	98.0	100.0	
Missing	System	2	2.0		
Total		102	100.0		

Table 14, demonstrates respondents' take on whether supported teaching in schools (STS) takes larger portion of teaching, learning and assessment credit hours. In response to this, 84% of the tutors said that the STS was a challenge to the successful implementation of new curriculum at the colleges of the education. The tutors enumerated a number of challenges that the STS has posed to the new curriculum. Tutors who supervise what these students do have limited time to supervise the students' reports from the STS. This has culminated in shoddy work by a number of tutors who hitherto would have performed creditably in the absence of the aforementioned problem. On the contrary, 14% of the tutors did not think this was the case. Their position was simply that the STS is an experience-oriented exercise which has provided student teachers with prerequisite skills and motivation to teach in future. they however, said that when the college triple track system stabilizes, a number of these current problems will be brought to their barest minimum. Two of the responded sat on the fence with no reason for their decision not to comment on the issue at hand. The graph below, figure 14 shows tutors' opinion on the matter in debate.

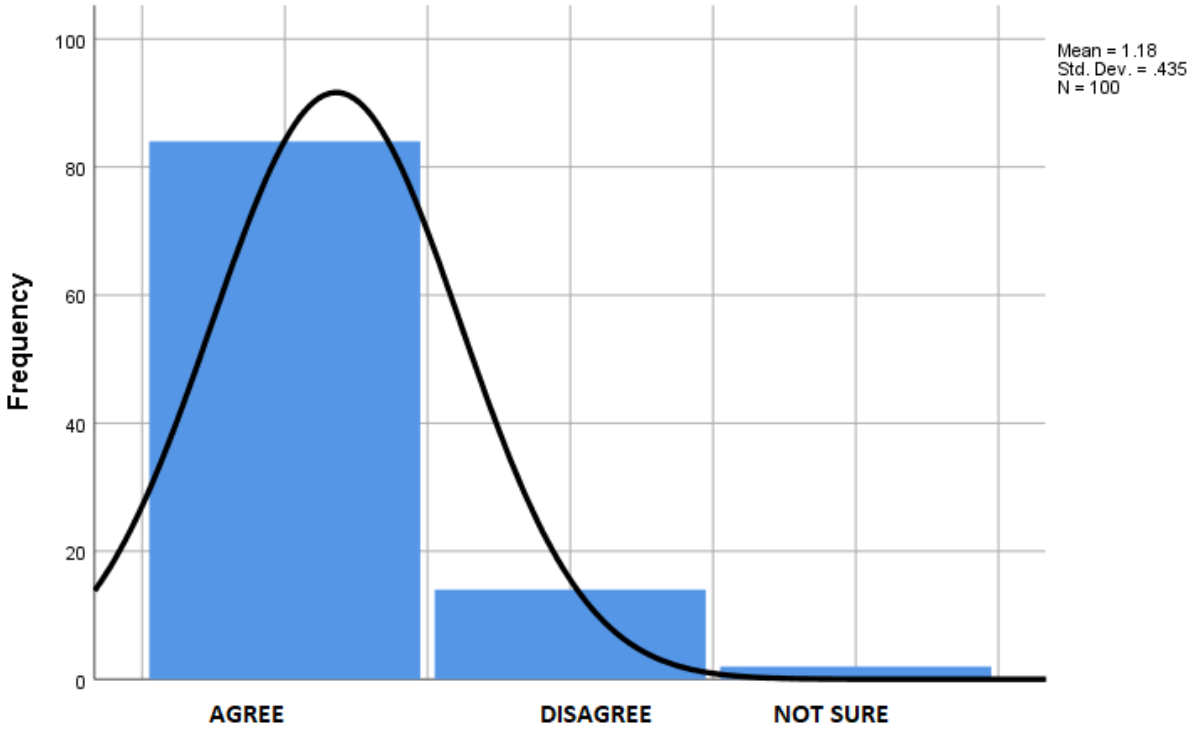

Figure 14: Histogram on supported teaching in schools (STS) takes larger portion of teaching, learning and assessment credit hours

Discussion

Teachers must have faith in the execution and intent of the materials they utilize when implementing new curricula to ensure accurate implementation (American Institute for Research [AIR], 2016; Early, Rogge, & Deci, 2014). Finding out what influences or hinders teachers' ability to adopt a new curriculum effectively could point in the right way for supporting those changes. According to Lochner, Conrad, and Graham (2015), teachers play a crucial role in determining how well a curriculum is presented in order to support student development and growth. This study has revealed a number of lapses that need attention from policy developers and implementors including the Government of Ghana. The generality of the challenges as per the accounts of the respondents show that the tutors have little to do by way of solving the problem. The onerous lie on government, the ministry of Education and other stakeholders to take up the challenges and as a matter of urgency remedy the situation. This is in line with the finding of Olamo *et al.* (2019). they stated in their investigations that the lack of stakeholder commitment is the key factor in the adoption of modular curriculum. They went on to say that among the issues impeding the effective implementation of a curriculum are a lack of commitment from the relevant stakeholders, a lack of trainings to raise awareness, and a lack of coordination between the relevant agencies. Getting over 98% of qualified tutors who are supposed to be implementing the curriculum suggests that, government must make frantic efforts to ensure their stay in order to prevent attrition. In addition, the tutors must be given adequate in-service training so that they can be abreast with modern trends in educating the modern teacher. The aforementioned challenges facing the implementation process should be worrying to policy makers thus, must be given the needed attention they deserve because the implication of these problems to classroom activities is dire. It is interesting to note that tutor and laboratory technician qualification cannot be toyed with so far as the implementation process is concerned. The curriculum will be implemented on sound footing only and only if tutors and laboratory technicians have the pre-requisite skills and knowledge to implement it. Another worrying trend unveiled in this research has to do with the limited number of laboratory technicians in the colleges who by large extent are equally underqualified. We contend that the colleges will only churn out quality basic school science teachers only when the colleges have well resourced laboratories where laboratory work is at the heart of teaching learning and assessment. One of the main instruments that helps students to understand both scientific information and how to

practice science is science practical (Hart, 2018). It is evidentially clear that doing practical work in class has its own difficulties. Many teachers have over the years struggled to find appropriate time, space, and resources to organize science practical but must we continue in that state where classrooms are turned into laboratories because there are no science laboratories and even Lab technicians to man them? The worry about student inexperience in identifying and operating scientific equipment, as well as health and safety concerns must not be underestimated if the new curriculum is to achieve the goals for which it has been drafted and handed over to tutors to handle in the colleges of education.

Conclusion

One remembers the dependable tutor with appreciation, but also with thanks for those who had an impact on the emotional lives of those he/she teaches. although the curriculum includes a wealth of essential raw materials, it suffices to say that these raw materials are supposed to be turned around by the implementors to make them contribute to the rationale for their introduction. it was concluded that the pre-requisite qualification to teach in the colleges of education in Ghana thus, master of philosophy in any teaching subjects and for technicians at least a first degree in the various disciplines is under suspect across the colleges. this certainly can have a negative impact on the implementation process as implied in Frankel (2010). He noted that highly trained teachers use effective teaching methods and that kids taught by this level of teachers perform better academically as a result of the teachers' positive attitudes. He continued by saying that highly qualified instructors convey their lessons in an engaging manner that provides pupils a sense of comprehension and topic mastery. The aim of every country's educational system is to facilitate growth and development in economics, commerce, trade and scientific advancement (Ozturk, 2001). Anything short of that is a farce with a prima farce of destroying the beneficiaries of the designed education. Tutor and instructor qualification is a suspect in the curriculum implementation process; a conclusion drawn from the study. Many challenges militating against successful implementation of curriculum have been enumerated. Implementors of the curriculum have mentioned among other things, triple track system, busy college timetable, time spent on supported teaching in schools (STS) among other things as challenges militating against the implementation of the new curriculum in basic schools. Teacher support through professional development also took a center stage of the study as tutors agree that in-service training was woefully inadequate.

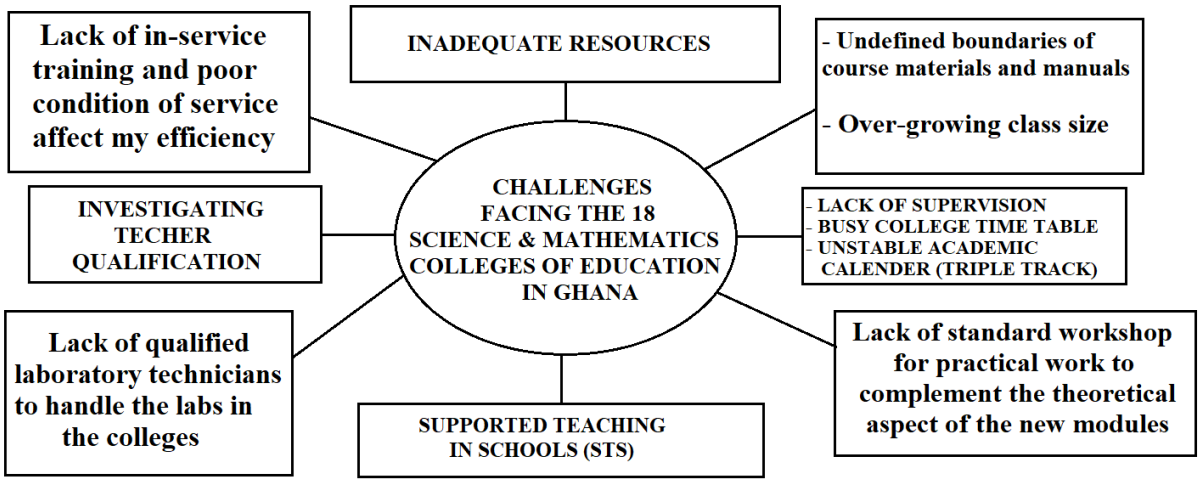

Figure 15: Summary of challenges facing the implementation process

RECOMMENDATIONS

The following recommendations were found worthwhile:

1. Tutors with first degree should be made to go for further studies or quit the system to allow for qualified tutors to come in. similarly, technicians in the other fields like ICT, and technical departments with HNDs should be encouraged to go for further studies or better still give way to more qualified instructors.
2. Government should equally improve on infrastructure on the various college campuses to reduce class size and also open access in order to do away with the triple track system.
3. Other stakeholders in education must support government to provide science equipment to stock the science laboratories for serious science practical.

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