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The Conditions under Which Integrated Science Is Taught in Selected Secondary Schools in Sierra Leone

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Abstract:
The study examined the conditions under which Integrated Science is taught in selected junior secondary schools in Sierra Leone as perceived by heads of departments of Integrated Science, the Integrated Science teachers and pupils. The study entails a mixed design of both quantitative and qualitative materials obtained through an ex-post- facto research approach. From a population of 4,200, a purposive sample size of 1,300 participants were randomly selected. Data were collected through questionnaires and analyzed.
The findings of the study revealed that Integrated Science is taught within congested classroom environments, inadequate time allocation, incomplete coverage of the West African Examinations Council's Integrated Science Teaching Syllabus and marginalization of heads of departments in the teacher recruitment procedures by the principals.
To reduce these problems, key stakeholders should play critical roles in improving the teaching environment, including reducing the teacher/pupil ratio so that individual pupils will have increased teacher attention, and pupils' preparation could become more effective. Increased allocation of funds for the education sector by government to build more classrooms could reduce class sizes. Teachers should end eavour to ensure adequate time is available for coverage of the teaching syllabus of Integrated Science
Principals should ensure that Integrated Science heads of departments are involved in the teacher recruitment process, to ensure that dedicated and competent teachers are employed. They should be supported to regularly participate in professional development activities thereby enhancing pupils' academic performance in Integrated Science.

Keywords: *Conditions, integrated science, performance, teaching, learning, junior secondary school, Sierra Leone*

1. Introduction

Integrated Science is one of the core subjects taught in the Sierra Leone education system, especially at the junior secondary school level. This subject is meant to orient the pupils with the world of studying and practicing scientific methods, following the basic environmental science at the primary school level, which serves as a bedrock for the junior secondary school.

Furthermore, it was introduced to be taught as a single subject contrived through an integrated design of the basic sciences of Biology, Chemistry, and Physics etc. When it is taught as a science course, pupils gain the concept of the fundamental unity of science, and also minimizes the repetition of subject matter when taught separately in the various specialized basic science subjects.

According to Gbamanja (1999), the principles of integration are intended to produce a course which is relevant to students' needs and experiences, lays adequate foundation of cultural dimension to science education. Integrated Science, as presented is a good move to achieving scientific literacy, understanding the processes of science, increasing students' interest in science, meeting the needs of the learners and showing the humanistic character of the discipline as if science is married to society.

Gbamanja (1992) further asserts that, Integrated Science is unique from Biology, Chemistry, Geography and Physics because it is holistic in nature and satisfies the following:

- Traditional subject boundaries do not exist;
- The course is taught towards the realization of certain learning outcome;

- The logical sequencing of themes is discernible;
- It has a lot of activities, which makes students actively involved in learning.

Given these justification of integrated science, one begins to appreciate its relevance as a foundation for the pure sciences like Physics, Chemistry and Biology at the senior secondary school level. It however appears that issues such as the conditions under which the subject is taught hamper the teaching and learning of Integrated Science in Sierra Leone.

2. Statement of the Problem

The introduction of Integrated Science curriculum at the junior secondary level in Sierra Leone is aimed at producing academically sound junior secondary school graduates to feed into the senior secondary schools' pure science stream.
However, the Integrated Science curriculum has been criticized over the years by stakeholders for its inadequacies. Its main problem lies in the poor performance of candidates in the Basic Education Certificate Examination (BECE). Presently, the interest of pupils in Integrated Science as a subject is low. When pupils consistently perform poorly, it implies that adequate teaching and learning did not take place. Observation of these circumstances of teaching/learning Integrated Science leaves an educational researcher with only a pressing investigative obligation. It is against this backdrop the researcher examined the conditions under which Integrated Science is taught in selected junior secondary schools in Sierra Leone.

3. Research Questions

The following research questions were formulated as guide to the study:

- What are the average class sizes of Integrated Science lessons of the junior secondary schools?
- What are the durations and total numbers of teaching periods allotted for teaching Integrated Science per week in the junior secondary schools?
- What are the perceptions of teachers and students on the issues of adequacy of periods allocated for teaching / learning of Integrated Science?
- What are the extra incentives provided to teachers of Integrated Science?
- What are the perceptions of teachers on accessing and completing of WAEC, BECE syllabus in Integrated Science?
- What are the perceptions of heads of Integrated Science departments in the recruitment of teachers for Integrated Science and what do they look out for?

4. Methodology

4.1. Research Design

The study entails a mixed design of both qualitative and quantitative materials derived through ex-post- facto research approach.

4.2. Population

A target population of 4,200 which consisted of all JSS 3 pupils (3,000) who have been in the selected schools for at least a period of two years, all the Integrated Science Teachers (1,000) and Integrated Science Heads of Department (200) in the junior secondary schools of Sierra Leone.

4.3. Sample and Sampling Technique

Purposive sampling technique was adopted to select the subjects for the study. The state has three provinces and the Western Area. In each of the regions (Eastern, Northern and Southern), schools were randomly selected by districts and locations (urban and rural). These schools included only boys, only girls and mixed sex schools. A sample size of 1,300 participants was involved in the study that consisted 100 HoDs, 200 Integrated Science teachers and 1,000 students.

4.4. Research Instrument

The instrument used to generate data for the study was a set of questionnaire developed on the background information and conditions under which Integrated Science is taught in the junior secondary schools. The questionnaire contained items on personal information of the respondents and items on opinions about conditions under which Integrated Science is taught.

The instrument was validated by a team of Science Education experts of the Njala University. The experts' suggestions were used to produce a copy of the instrument, which were field-tested. A Cronbach alpha coefficient of reliability value of 0.74 was obtained for the instrument.

4.5. Data Analysis

The data collected were analyzed using the Statistical Packages of the Social Sciences (SPSS) to generate descriptive statistics.

5. Results and Discussions

5.1. What are the Average Class Sizes of Integrated Science Lessons in the Selected Secondary Schools?

The conditions under which teaching and learning take place contribute significantly to the academic performance of students. The responses were explored with the use of ranges of averages of class size items as options. Table 1 shows the ranges of average sizes of the classes of the selected schools by regions.

As indicated, in the Northern Region, 43.14% of teachers had 60-69 pupils as class size, while 19.61% had 70 and above pupils. The table further shows that most of the schools in the Northern Region were over crowded. In the Southern Region, 48.89% of the teachers had 60-69 pupils as class size while 35.56% had 50-59 pupils as class size. Mean while, the remaining minority of teachers revealed either 40-49 or 70 and above as their ranges of averages of class sizes.

In the Eastern Region, 64.71% of the teachers had 60-69 pupils as average class size followed by 19.61% with 50-59 pupils as class size. In the Western area, 62.50 % of the teachers had a range of 60-69 as average class size. From the study, it is observed that most (54.19%) of these teachers reported that their schools were over-crowded with a range of 60-69 pupils as average class sizes.

These findings reveal that most of the schools are congested or over crowded irrespective of gender-type schools. This observation is contrary to the average class size stipulated by Ministry of Education Science and Technology (MEST), which according to the policy, the teacher-pupil ratio is 1:45. (GOSL, 1995)

These findings call attention to the statement of Njoku (2004) that overcrowded science classrooms are not easy to manage and organize for any meaningful lifelong learning; there is every need to reduce overcrowding of science classes he asserted. Ivowi et al. (1992) also suggested that shortage of funds for equipment and materials for fruitful practical work, especially in view of large class sizes in most schools, is a problem.

Gallacher (1998) pointed out that class sizes should not exceed thirty-five pupils, if a positive learning result was to be achieved. It is therefore inferred that the majority of these schools were overcrowded with students, thus teaching and learning are not as effective as society expects. Pupils' poor academic performance is imminen

Region	Ranges of Average Class Sizes				
	30-39	40-49	50-59	60-69	70 & above
Northern n=51	00 (0.0%)	02 (3.92)	17 (33.33)	22 (43.14)	10 (19.61)
Southern n=45	00 (0.0%)	04 (8.88)	16 (35.56)	22 (48.89)	03 (6.67)
Eastern n=51	00 (0.0%)	02 (3.92)	10 (19.61)	33 (64.71)	06 (11.76)
Western Area n=32	00 (0.0%)	00 (0.0%)	02 (6.25)	20 (62.5)	10 (31.25)
Grand Total n= 179	00 (0.0%)	08 (4.47%)	45 (25.4%)	97 (54.19%)	29 (16.20%)

Table 1: Distribution of Responses on Ranges of Average Class Sizes of Students in the Junior Secondary Schools (N = 179)

5.2. What Are the Durations and Total Number of Teaching Periods Allocated for Integrated Science Teaching Per Week in the Junior Secondary Schools?

Responses of Integrated Science teachers on the periods allocated to them to teach Integrated Science is illustrated in Table 2. In the North, 64.71% of the teachers responded that the period allocated was 40 minutes, 27.45% of the respondents indicated 45 minutes ; yet still 7.84% had 50 minutes. Meanwhile in the South, 68.89% and 31.11% had 40 and 45 minutes respectively. None of the schools in the region had 50 minutes as time allocated to teach.

In the Eastern Region, 70.59% had 40 minutes as time allocated on their time table to teach Integrated Science, while 29.41% had 45 minutes.

In the Western Area, 72.63 % had 40 minutes allocated as time to teach Integrated Science while only 6.25% had 45 minutes allocated. Nationally, (grand total for all regions combined), 72.63%, 25.14% and 2.23% had 40 minutes, 45 minutes and 50 minutes respectively as the periods on their time tables to teach Integrated Science.

The findings of the study show that there is variation in the time allocated for the teaching of Integrated Science, though the Education Policy (GOSL, 1995) states 40 minutes per period. The amount of time allotted to the teaching of Integrated Science could have a direct influence on students' content comprehension assuming that other necessary inputs are in proper balance. This implies that if adequate time is given to the teaching of Integrated Science, students' understanding

will improve granted that the quality of teaching and methodologies are sufficiently supportive for the learners' understanding.

But with insufficient time allocated, it does not allow practicals to be effectively done thereby inhibiting the effective teaching and learning of Science in schools resulting in not completing the teaching syllabus. This finding is in line with the finding of On ocha and Okpala (1995) who assert that achievement in Integrated Science is influenced by the time allotted for the teaching/ learning of the subject.

In terms of responses of teachers on the total numbers of teaching periods of Integrated Science in the junior secondary schools, in the North, especially in the Bombali and Tonkolili District schools, 23.52% of the teachers had periods ranging from 25-29. In the entire Northern Region, majority (50.98%) of these teachers had periods ranging from 20-24, which is below the required number of teaching periods prescribed by the Ministry of Education, Science and Technology. That is 30 teaching periods per week for a teacher.

It is observed that in the south the highest percentage (71.11%) with corresponding frequency of 32 for the four districts fell between 20-24 periods, that is, Bo (16), Bonthe (04), Moyamba (10) and Pujehun (02).

According to the data in Table 2, a total of 68.63% of the teachers had a total number of periods ranging between25-29 in the Eastern Region. This also falls below the required number of periods prescribed by MEST.That is,30 periods per week per teacher. The table further illustrates that in the Western Area schools, a moderate (40.62%) of these schools, had their teachers with teaching periods ranging between25-29 and 50.00% of the teachers had the highest numbers of periods ranging between 20-24 while 40.62% were between 25-29 periods.

For the collapsed data, 11.73% of teachers had periods ranging between 15-19, 45.81% had periods ranging between 20-24, 38.55% had 25-29 periods and 3.91% had periods between 30-34. This shows that the majority of teachers in the schools were underutilized. Few (3.91%) of all the regions combined had periods above the required number of periods approved by the Ministry of Education. The implication of this situation is that there is less than full load, less interaction of teachers with the learners and supportive of the issue of non-coverage of syllabuses. If these issues remain unaddressed performance in Integrated Science will continue to be below the expected standard.

Region	Duration Response				Ranges of Numbers of Periods Per Week						
	40 min	45 min	50 min	60 min	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Northern Region	33 (64.71)	14 (27.45)	4 (7.84)	0 (0.0)	0 (0.0)	0 (0.0)	12 (23.52)	26 (50.98)	12 (23.52)	1 (1.96)	10 (19.6)
Southern Region	31 (68.89)	14 (31.11)	00 (0.0)	00 (0.0)	00 (0.0)	00 (0.0)	04 (8.89)	32 (71.11)	09 (20.0)	00 (0.0)	00 (0.0)
Eastern Region	36 (70.59)	15 (29.41)	00 (0.0)	00 (0.0)	00 (0.0)	00 (0.0)	02 (3.92)	08 (15.69)	35 (68.63)	06 (11.76)	00 (0.0)
Western Area	30 (93.75)	02 (6.25)	00 (0.0)	00 (0.0)	00 (0.0)	00 (0.0)	02 (9.38)	16 (50.0)	13 (40.62)	00 (0.0)	00 (0.0)
Grand Total	130 (72.63)	45 (25.14)	04 (2.23)	00 (0.0)	00 (0.0)	00 (0.0)	21 (11.73)	82 (45.81)	69 (38.55)	07 (3.91)	10 (19.6)

Table 2: Distribution of Responses of Teachers on Durations and Total Number of Teaching Periods Allocated for Integrated Science Teaching per Week in the Junior Secondary Schools
Figures in Parentheses are Percentages

5.3. What are the Perceptions of the Teachers and Pupils on the Time and its Adequacy for Teaching Integrated Science on the Time Table?

The adequacy of time allocated on the schools' teaching time table is presented in Table 3. From the table, it is observed that majority of the boys (91.68%) responded that the time allocated was not enough while 98.23% of the girls said the same but 5.97% of the boys, 0.43% of the girls, considered it enough.

The data further reveals that the majority of the male teachers (90.18%) and female teachers (87.51%) suggested that the periods were not enough, while the rest of the teachers responded otherwise. If the length of the periods is short and assessed as inadequate for effective teaching of Integrated Science; then direction of adjustment would be to have more periods on the timetable.

	Teacher		Pupils	
	Male	Female	Boys	Girls
Adequacy	Percentage	Percentage	Percentage	Percentage
Enough period	9.82	12.5	5.97	0.43
Not enough	90.18	87.5	91.68	98.23
No response	0.0	0.0	2.35	1.34

Table 3: *Distribution of Teachers' and Students' Responses on Adequacy of Periods Allocated for Teaching Integrated Science*

5.4. What are the Situations in the Schools for Provision of Incentives Provided for Integrated Science?

It is observed in Table 5 that in the North, 100%, 72.55% and 64.71% respectively of the teachers had no incentives from the government, school and alumni. In all the districts of the Northern Region, none of the teachers received incentive from the Government, 27.45% and 35.29% had incentive from their schools and alumni respectively.

Similarly, in the Southern Region, none of the districts received incentive from the government. An equal percentage (26.67%) received incentives from schools and alumni. Bon the and Pujehun districts did not receive incentives from their schools and alumni.

In the Eastern Region, none of the selected teachers received incentive from the government only 11.76 % received incentives from both their schools and alumni. The selected schools in Kono District neither received incentives from the schools nor from the alumni.

In the Western Area, none of the selected teachers received incentives from the government. None of the teachers in the Western Rural received incentives from their schools and alumni. In the Western Urban District however, 18.75% received incentives from the schools and 25% from the alumni.

All the selected schools in the study area did not receive incentives from the government, only 21.23% and 24.58% of the Integrated Science teachers from the sample of 179 received incentives from their schools and alumni. The rationale for provision of incentive for Integrated Science teachers is that there is lacks of science teachers in schools, most teachers are not motivated to work in schools located in remote areas, there is also no encouragement on students studying science nor promote effective teaching of science. The implication is that with no incentive there will be a tendency of lack of effective teaching and the pool of Science teachers will be low.

These findings affirm the assertions from previous studies such as Darling-Hammond (1999) and Dozier and Betroth (2000), that, the lack of incentives to teach, wrong replacement of priorities of school heads to direct their effort into useful professional development for teachers, lack of opportunity for teachers to collaborate with other teachers, general lack of respect for the profession and bureaucratic practices associated with teaching in schools are barriers to achieving quality teaching and learning.

Region	Teachers Response					
	Government		School		Alumni	
	Yes	No	Yes	No	Yes	No
Northern n = 51	00 (0.0%)	51 (100)	14 (27.45)	37 (72.55)	18 (35.29)	33 (64.71)
Southern n = 45	00 (0.0%)	45 (100%)	12 (26.67%)	33 (73.33%)	12 (26.67%)	33 (73.33%)
Eastern n = 51	00 (0.0%)	51 (100)	06 (11.76)	45 (88.24)	06 (11.76)	45 (88.24%)
Western Area n = 32	00 (0.0%)	32 (100%)	06 (18.75%)	26 (81.25%)	08 (25.00%)	24 (75.00%)

Table 4: Distribution of Teachers' Responses on Whether Incentives are Given to Integrated Science Teachers or not. n = 179

5.5. What are the Perceptions of Teachers on Accessing and completing the BECE Integrated Science Syllabuses?

Accessing and completing of syllabuses for any external examination contributes to building the confidence to both the subject teacher and pupils that are prepared for such examination. Table 5, depicts responses of Integrated Science teachers on accessing and completing the BECE syllabuses in relation to the teaching of all the topics in the syllabuses before the examination

Northern Region: In this region, it is clear that 100% of the teachers do have access to the syllabuses. In terms of completion of the BECE syllabuses, 100% of the teachers from Kambia and Koinadugu District responded that they do not complete the syllabuses. Meanwhile, Port Loko, Tonkolili and Bombali districts, reported percentages below 29% for completion with vast majority not completing their syllabuses.

Southern Region: It is also clear that 100% of the teachers do have access to the syllabuses but generally do not complete their syllabuses before the exams are taken especially in Bonthe and Pujehun Districts. In Bo, 33.33% and Moyamba 28.57% do complete their syllabuses, while the rest; 71.43% in Moyamba, and 66.67% in Bo, do not complete their syllabuses. In the South, it was observed that 75.56% do not complete the syllabus while 24.44% complete the syllabus.

Eastern Region: Teachers of this region do have access to the Integrated Science teaching syllabus but 100% of the respondents in Kono indicated that they do not complete their syllabuses. In Kailahun District, 11.11% while in Kenema, 38.89% complete their syllabuses. Comparatively, 17.65% of these respondents do complete their syllabuses while 83.35% do not, before the BECE in the Eastern Region.

Western Area: As presented in Table 5, 66.67% of the Western Rural respondents do not complete their syllabuses while in the Western Urban District, 53.13% do complete their syllabuses. It is observed that in the Western Area, especially in the Urban District, higher percentage (53.13%) did complete their syllabuses. The reason for the higher percentage in the urban district is because these schools are privately and government owned and the schools are more competitive in the urban than the rural area.

From the findings it was observed that the syllabuses are available in all the schools, this leaves the impression for application to the teaching situations. The overall implications are that teachers could be far less comfortable or confident with their preparation of the learners for BECE. Also many of the students may not know about the prevailing deficit in coverage of syllabuses, they would be shocked by questions on unfamiliar topics for the examinations. Those students who know that the syllabuses were not covered before the examinations would enter the exams with little or no confidence reflecting high levels of uncertainties and insecurity. These circumstances could impact the examination results negatively.

Region	**Response on Whether Integrated Science Teachers Have Access to WAEC Syllabus and Do Complete the Syllabus**							
	Access to Syllabus				Completion of the Syllabus			
	Yes	**%**	**No**	**%**	**Yes**	**%**	**No**	**%**
Northern n = 51	51	100	00	0.0	08	15.69	43	84.31
Southern n = 45	45	100	00	0.0	11	24.44	34	75.56
Eastern n = 51	51	100	00	0.0	09	17.65	42	83.35
Western Area n = 32	32	100	00	0.0	22	62.50	10	37.50
Total	179	100	00	0.0	50	27.93	129	72.07

Table 5: Distribution of Teachers' Responses on Access of Teachers to Integrated Science WAEC Syllabus and whether the Syllabus is Completed by the Teachers or not. n = 179

5.6. What are the Perceptions of the Heads of Integrated Science Departments in the Recruitment of Teachers for Integrated Science and What do They Look out for?

Recruitment of qualified staff to a department to teach a particular subject has impact on the teaching and learning process which in turn aids good performance. Table 6a, indicates the participation of Heads of Integrated Science Departments during recruitment of teachers in the selected schools by the principals. It is observed that 72.41% of these heads in the North, 65.22% from the South, 66.67% from the East and 6.11% from the West, responded that they do not participate in the recruitment of teachers. In the entire country, 32.99% accepted that they took part in the recruitment of teachers for Integrated Science while 67.01% do not take part in the recruitment process.

This implies that with the high percentage of these heads of departments who do not participate in the recruitment process; there could be the tendency that the principals could employ inexperienced, not dedicated, untrained and unqualified teachers for the teaching of Integrated Science, which without doubt has a potential of affecting the academic performance of the students negatively.

For these heads of Integrated Science departments, who participated in the recruitment of teachers, below is a list of qualifications they look out for:

- Bachelor of Science in Education (B.Sc.Ed.),
- Higher Teachers Certificate Secondary (HTCS),
- Bachelor of Education (B.Ed) and
- Higher National Diploma (HND)

The respondents suggested that they were generally interested in teachers that are qualified in the sciences only. The sciences are also inclusive of subject of Integrated Science. By implication, professional teacher who has the requisite qualification in the teaching subject area is capable of handling the complexities associated with teaching of his subject and also capable of

motivating the students to meet the demands of the Integrated Science curriculum for effective teaching thereby leading to good performance outcome of the students in external examinations.

The issue of the principals not involving the heads of departments in the recruitment of their departmental staff leave no alternative but with the tendency of employing wrong staff members who may not have good codes of conduct though they may be qualified and the students, parents, colleague staff and the public may not enjoy and appreciate their services since they may not play any significant role in science acquisition.

Similarly, the alternative measures where there are no trained and qualified teachers, HODs resort to employing part-time teachers and sometimes the Untrained and Unqualified teachers. It could be noted that most of these part-time teachers are overloaded with teaching tasks as they do not teach in a single school this will inhibit effective teaching of the students.

Darling-Hammond (1997) confirms from this finding that there has been an increasing concern worldwide about the difficulties of supplying sufficient number of qualified science teachers. According to him, failure to staff schools with enough qualified science teachers has been recognized as a major problem that could retard the quest for developing scientific literacy.

Region	District	Response				Qualification Needed (what they look for)					
		Yes	%	No	%	B.Sc.Ed	OND	HND	HTCS	B.ED	M.Sc.
Northern n=29	Bombali	02	0.25	06	0.75	√	-	√	√	√	√
	Kambia	01	16.67	05	83.33	√	-	√	√	-	-
	Koinadugu	01	50.00	01	50.00	√	-	√	√	-	-
	Port Loko	02	28.57	05	71.43	√	-	√	√	-	-
	Tonkolili	02	33.33	04	66.67	√	-	√	√	-	-
	Total	08	27.59	21	72.41	-	-	-	-	-	-
Southern n=23	Bo	04	36.36	07	63.64	√	-	√	√	-	-
	Bonthe	00	0.00	02	100,00	√	-	-	√	-	-
	Moyamba	03	42.86	04	57.14	√	-	-	√	-	-
	Pujehun	01	33.33	02	66.67	√	-	-	√	-	-
	Total	08	34.78	15	65.22	√	-	-	√	-	-
Eastern n=27	Kailahun	04	44.44	05	55.56	√	-	-	√	-	-
	Kenema	02	20.00	08	80.00	√	-	-	√	-	-
	Kono	03	37.50	05	62.50	√	-	-	√	-	-
	Total	09	33.33	18	66.67	√	-	-	√	-	-
Western Area n=18	Western Rural	03	75.00	01	25.00	√	-	-	√	-	-
	Western Urban	04	28.57	10	71.43	√	-	-	√	-	-
	Total	07	38.89	11	6.11	√	-	-	√	-	-
Grand Total n=97		32	32.99	65	67.01	-	-	-	-	-	-

Table 6: Distribution of Heads of Integrated Science Departments on Their Participation in Teacher Recruitment and what they look out for. n = 97

An alternative means of recruiting staff by Integrated Science Heads of Department especially when qualified teachers are not readily available is another solution to teacher problem in schools in Sierra Leone. Table 7 shows the frequencies and percentages of responses of respondents in the survey with regards to the alternatives. The options included; recruiting unqualified teachers; no teacher unattended; involving substitute teachers and employing part-time teachers.

Region	Responses			
	Qualified Teacher	No Teacher Unattended	Substitute Teacher	Part-Time Teacher
Northern	14(48.28%)	00(0.0%)	01(3.45%)	14(48.28%)
Southern	11(47.83%)	00(0.0%)	00(0.0%)	12(52.17%)
Eastern	07(25.93%)	00(0.0%)	01(3.70%)	19(70.37%)
Western Area	04(22.22%)	00(0.0%)	00(0.0%)	14(77.78%)
Grand Total n= 97	36(37.11%)	00(0.0%)	02(2.06%)	59(60.82%)

Table 7: Distribution of Hods' on Alternative Teachers Employment When Qualified Teachers are Not Readily Available

Northern Region: The table reveals that 48.28% of all the districts opined of recruiting unqualified teachers 3.45% responded to involving substitute teachers while 48.28% accepted of recruiting part-time teachers.

Furthermore, 48.28% from the North, of these heads resorted to recruiting unqualified teachers and employing part-time teachers.

Similarly, in the Southern Region, 52.17% of these heads took the option of employing part-time teachers, followed by option of recruiting unqualified teachers (47.83%). In the Eastern Region, out of a sample of 27, it was observed that most of these heads (70.37%) took the option of employing part-time teachers followed by option of recruiting unqualified teachers (25.93%).

In the Western Area, especially in the Rural District, out of a sample of 18, 22.22% took option of recruiting part-time teachers and 77.78% of the urban respondents also took the same option. For the entire Western Area, it was observed that 77.78% took the option of recruiting part-time teachers while 22.22% took the option of recruiting unqualified teachers. See Table 6b for more details.

6. Conclusion

The learning of Integrated Science in part, depends on the way it is presented and the conditions under which the learning takes place for effective academic performance. In as much as the learning environment is conducive especially for the students with sizeable classroom environment, sufficient time allocated for teaching Integrated Science, sufficient teaching resources, equipped laboratories, access and completion of the syllabus ahead of the public examination and the prompt recruitment process of the teachers in the department, could help improve performance of students at the Baseball these identified variables could not be achieved without making provision for all of them in their correct proportion. Hence all stakeholders in secondary education should jointly work together in creating conducive environment for effective teaching and learning of Integrated Science, to ensure better performance of students in public examination like BECE.

7. Recommendations

Challenges like large class size, insufficient time allocation for teaching Integrated Science, lack of incentives for Integrated Science teachers on the part of the government, school and alumni, incompletion of WAEC,Integrated Science BECE syllabus and the recruitment procedures of Integrated Science Teachers in the departments all have significant influence on students' academic performance at BECE. The school administrators should be conscious of these challenges and other factors outside the scope of this study that can improve students' academic performance.

To this end, educational curriculum planners, administrators in schools, officials of MEST, Integrated Science Teachers, the students and the society at large, have crucial role to play in improving students' performance and solicit their support in putting modalities in place in improving on the conditions under which Integrated Science is taught.

To ensure better performance of students, there should be reduction in the teacher/student ratio to the minimum so that teachers will have enough time for preparation and evaluation of instructions.

There should be an increased allocation of funds for education by government to build more new classrooms so that class sizes can be reduced.

Principals of the JSS must ensure that their schools have enough classrooms and seats for students and their average class size should not exceed 40 students per class so that teachers can effectively monitor the progress of their students.

Curriculum planners should modify the curriculum based on popular demands, example more time allocated for Integrated Science per week in the school time table to provide opportunity for inquiry-oriented learning

The time duration allocated per period to the teaching of Integrated Science and the total time per week should be increased from 40 minutes per period to 50 minutes and from 160 minutes per week to 200 minutes per week to enhanced inquiry based and activity-oriented teaching.

There should be regular monitoring of all the teachers in the schools to ensure that they teach within the scope of the syllabus to its completion before the students' take the BECE.

Principals should ensure that they involve Integrated Science HODs in the teacher recruitment process to ensure that dedicated and competent teachers are employed and should be motivated to regularly participate in professional learning activities.

Government should ensure that salaries of teachers are regularly paid to enhance motivation of teachers toward work. The Alumni and the school administration should also provide extra incentives to the teachers.

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