COMPARATIVE ANALYSIS OF SECONDARY SCHOOL STUDENTS' PERFORMANCE IN SCIENCE SUBJECTS IN EKITI STATE, NIGERIA

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ABSTRACT: *The purpose of this study was to compare secondary school students' scientific performance in Ekiti State, Nigeria. To accomplish this, the researcher used an ex-post facto research method. The results of students who sat the West African Senior School Certificate Examinations (WASSCE) in all 141 secondary schools in Ekiti State from 2015 to 2019 were used by the researcher. Science students who sat for WASSCE in all of Ekiti State's public secondary schools between 2015 and 2019 made up the study's sample. As a result, data from the May/June 2014/2015, 2015/2016, 2016/2017, 2017/2018, and 2018/2019 Senior Secondary School Certificate Examinations were used in the study. In total, the study was guided by four research questions and one hypothesis. The research questions were examined using descriptive statistics such as frequency counts, percentages, mean, standard deviation, and graphs, while the hypothesis was validated using Analysis of Variance (ANOVA) at a significance threshold of 0.05 using the SPSS version 20 package. According to the findings of the study, students' performance in Chemistry was better than their performance in Physics and Biology across the five years analyzed. Students' performance in Biology, Physics, and Chemistry does not follow a predictable pattern, according to the findings of this study. According to the findings, students performed best in Chemistry, followed by Physics, and least well in Biology. As a result of the study's findings, it was suggested that the government provide enough and up-to-date laboratory equipment for schools, and that parents and other education stakeholders assist governments by contributing their own quota to school growth.*

KEYWORDS: comparative analysis, secondary schools, students' performance, science subjects

INTRODUCTION

Education is the complete process of human learning in which knowledge is transmitted, faculties are exercised, and skills are developed. Education is one of the most important aspects of advancement in every way. No country can achieve long-term economic greatness without major expenditures in human capital. Education helps to broaden people's perceptions and the world around them. Education benefits both individuals and society since it improves their quality of life. It boosts people's productivity and creativity while also improving their general health. Education is often regarded as the barometer by which the advancement of a nation could be measured (Olojo, 2021). The preceding has underlined the indispensable importance of education in bringing about beneficial changes in society in order to promote and facilitate a nation's and its citizens' overall development. Education is intended to improve a child's inventiveness and objectivity, among other things. It fosters a child's overall development, including physical, mental, emotional, social, moral, psychological, and intellectual growth. Education is commonly regarded as a nation's engine of growth and development, with students serving as the fulcrum of all educational processes (Olojo, Boris & Popoola, 2021). Education should be viewed as a profitable sector with the primary goal of maximizing profit by providing high-quality education that creates well-educated, skilled, and well-mannered individuals who meet the needs and requirements of a rapidly changing labor market. Without strong academic achievement, every educational innovation will be a massive failure (Achombo, 2010). As a result, every effort should be made at all times to maintain a high school level.

Science has traditionally been defined as a methodical investigation into the workings of nature with the goal of comprehending and guiding them for human advantage. It is a method of obtaining information, such as facts, principles, and theories. Science education, according to Pember and Humbe (2009), is an approach to teaching or training, usually in schools, to improve one's knowledge of the environment and to help one become more environmentally conscious; to develop one's skill of systematic inquiry as well as attitudinal one's characteristics, and to help one become more environmentally conscious Science education is concerned with the dissemination of scientific material and processes to those who are not traditionally considered members of the scientific community; these people could include students, farmers, market women, or an entire community (Aina, 2013). Every nation's progress depends on science education, which is why all educational institutions must take teaching and learning very seriously. Because of the importance, they place on science education in many industrialized countries, they have been able to achieve so much in science and technology.

Secondary schools are not only important in Nigeria's educational system, but they also serve as a link between primary and tertiary education. Secondary school education, according to Asikhai (2010), is expected to be the backbone and foundation for further education at postsecondary institutions. In Nigerian secondary schools, science is divided into three categories: biology, chemistry, and physics. These topics are critical to Nigeria's development as a nation and the realization of its enormous potential. The teaching of science topics in secondary schools is today

plagued by a slew of issues. The poor academic achievement of students in the sciences, as evidenced by the WAEC report and the results of the state common admission exams, has sparked a public uproar about the declining caliber of science education. Science subjects are already beset with difficulties. This is mostly in the area of laboratory and other teaching facilities being available in sufficient numbers for the number of students studying science.

Poor science performance has been linked to a lack of qualified science teachers, overcrowding in classrooms, and a lack of appropriate science equipment, among other factors. Measuring students' academic achievement is also a difficult task, since their performance of students is influenced by socioeconomic, psychological, and environmental factors. Whereas many studies have been undertaken on the causes of low academic performance in the sciences in Ekiti State, none has compared students' academic performance in the three science disciplines across a five-year period. As a result, the goal of this research is to compare student performance in the three science courses (Biology, Chemistry, and Physics) from 2015 to 2020.

Research Questions

The following research questions were raised to guide the study;

1. What is the mean average performance of students in three science subjects (ie Biology, Physics & Chemistry) in public secondary schools in Ekiti State?
2. What is the trend of students' performance in Biology in public secondary schools in Ekiti State?
3. What is the trend of students' performance in Physics in public secondary schools in Ekiti State?
4. What is the trend of students' performance in Chemistry in public secondary schools in Ekiti State?

Research Hypothesis

This null hypothesis was generated for this study:

H_o1: There is no significant difference in students' performance in the three science subjects (i.e. Biology, Physics & Chemistry) in public secondary schools in Ekiti State.

LITERATURE REVIEW

Scholars and academics have continued to be outraged by students' persistently poor performance in the sciences at the school certificate and related levels. As a result of stakeholders' concerns, a number of studies have been conducted. For example, Dinah (2013) discovered that the lack of access to text books, laboratory apparatus, and other learning materials contributes considerably to students' low performance in Biology exams. He also discovered that students who have a positive attitude toward the subject do better than those who have a negative attitude. Suman (2011) discovered that parental education and occupation have a beneficial impact on children's academic achievement of students in his study of the influence of parents' education and

occupation on student academic achievement in science subjects. Similarly, Femi and Adewale (2012) discovered that parents' educational qualifications and students' health status are key factors that affect students' academic achievement in a comparable study.

According to Akinsanya et al. (2014), parents' educational level has the greatest impact on their children's academic accomplishment. According to him, this is because children from more affluent families have more options to motivate them to study harder because they have access to learning resources such as the internet, newspapers, television, and other media. Students' performance is influenced by a variety of factors, including their learning abilities; however, because the new learning paradigm assumes that all students can and should learn at higher levels, this should not be viewed as a limitation because other factors, such as race, gender, and sex, can also influence students' performance. Akinnodi (2020) revealed that students' performance in Biology was better than their performance in Chemistry and Physics in the four years under consideration in the Comparative Analysis of Secondary School Students' Performance in Science Subjects in Ondo State. In fact, students performed best in Biology, followed by Physics, and lowest in Chemistry. This study's findings also demonstrated that students' performance in Biology, Chemistry, and Physics does not follow a predictable pattern.

METHODOLOGY

The study used an ex-post facto research strategy, which is a systematic empirical investigation in which the researcher does not have direct control over the independent variables since they have already manifested or are essentially impossible to influence. According to Onwumere (2005), ex-post facto research is a study in which the independent variable or variables have already occurred. As a result, the research is based on previously gathered information.

All students that sat for the West African Senior School Certificate Examinations (WASSCE) from 2015 to 2019 in all 141 secondary schools in Ekiti State made up the study's population. Students who sat for WASSCE in secondary schools in Ekiti State were chosen for the study using a purposive sampling technique.

The study employed an inventory from the May/June 2014/2015, 2015/2016, 2016/2017, 2017/2018, and 2018/2019 sessions of the Senior Secondary School Certificate Examination. The statistical analyses were performed using descriptive statistics such as frequency counts, percentages, mean, standard deviation, and graphs, while the hypothesis was validated using Analysis of Variance (ANOVA) at a significance threshold of 0.05 using the SPSS version 20 package.

RESULTS

Research 1: What is the mean average performance of students in the three science subjects in public secondary schools in Ekiti State?

Table 1: Performance of students in the three science subjects

Year	Subject	No. Reg	A1 – C6 (%)	D7 – F9 (%)
2014/15	Biology	6691	3974 (59.4)	2717 (40.6)
	Physics	6069	2863 (47.2)	3206 (52.8)
	Chemistry	6072	4580 (75.4)	1492 (24.6)
2015/16	Biology	6022	4730 (78.5)	1292 (21.5)
	Physics	5231	4173 (79.8)	1058 (20.2)
	Chemistry	5189	4403 (84.9)	786 (15.1)
2016/17	Biology	5641	4453 (78.9)	1188 (21.1)
	Physics	5250	2724 (51.9)	2526 (48.1)
	Chemistry	5258	4894 (93.1)	364 (6.9)
2017/18	Biology	5578	4637 (83.1)	941 (16.9)
	Physics	4989	4322 (86.6)	667 (13.4)
	Chemistry	5155	3964 (76.9)	1191 (23.1)
2018/19	Biology	5563	3922 (70.5)	1641 (29.5)
	Physics	5014	3386 (67.5)	1628 (32.5)
	Chemistry	5034	3873 (76.9)	1161 (23.1)

Table 1 revealed the performance of students in the three science subjects in public secondary schools in Ekiti State. The result showed that in 2014/2015 session, out of 6691 students that sat for Biology, 3974 representing 59.4% had between A1-C6, out of 6069 and 6072 who sat for Physics and Chemistry respectively, 2863 representing 47.2% and 4580 representing 75.4% has between A1-C6 in Physics and Chemistry respectively.

The result further showed that in 2015/2016 session, out of 2022 students that sat for Biology, 4730 representing 78.5% had between A1-C6, out of 5231 and 5189 who sat for Physics and Chemistry respectively, 4173 representing 79.8% and 4403 representing 814.9% has between A1-C6 in Physics and Chemistry respectively.

Moreover, it was revealed that in 2016/2017 session, out of 5641 students that sat for Biology, 4453 representing 78.9% had between A1-C6, out of 5250 and 5258 who sat for Physics and Chemistry respectively, 2724 representing 51.9% and 4894 representing 93.1% has between A1-C6 in Physics and Chemistry respectively.

Furthermore, it was shown that in 2017/2018 session, out of 5578 students that sat for Biology, 4637 representing 83.1% had between A1-C6, out of 4989 and 5155 who sat for Physics and Chemistry respectively, 4322 representing 86.6% and 3964 representing 76.9% has between A1-C6 in Physics and Chemistry respectively.

Lastly, the table revealed that in 2018/2019 session, out of 5563 students that sat for Biology, 3922 representing 70.5% had between A1-C6, out of 5014 and 5034 who sat for Physics and Chemistry respectively, 3386 representing 67.5% and 3873 representing 76.9% has between A1-C6 in Physics and Chemistry respectively. This is further depicted in figure i;
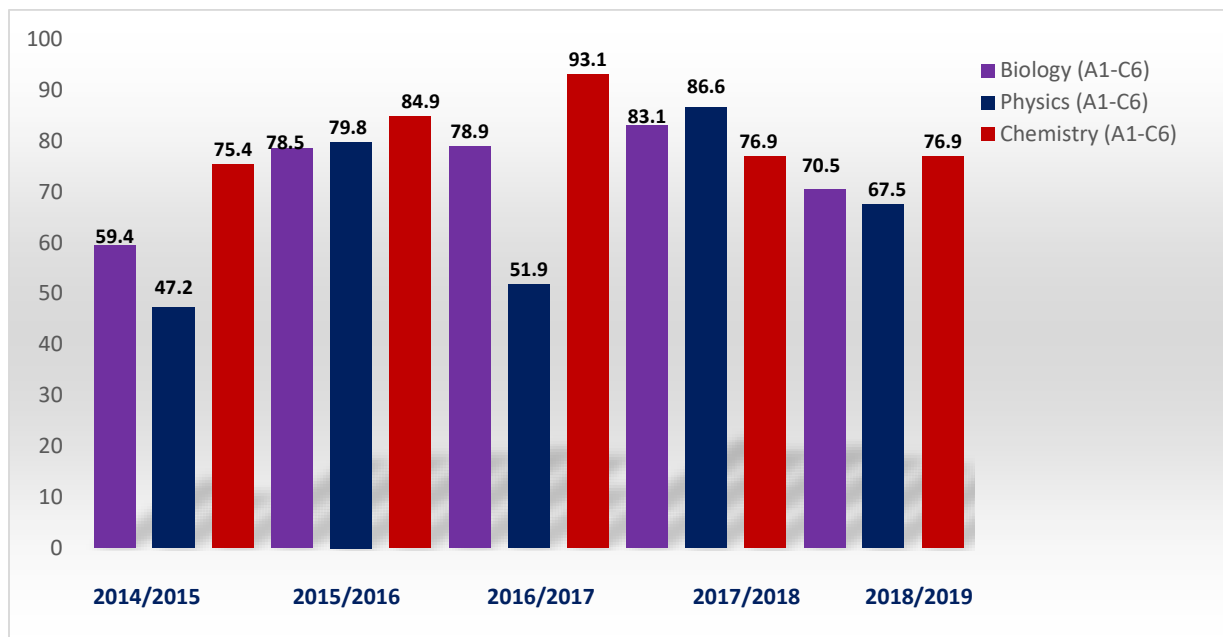
Figure i: Performance of Students in three science subjects

Research Question 2: What is the trend of students' performance in Biology in public secondary schools in Ekiti State?

Table 2: Performance trend of students in Biology

	2014/2015		**2015/2016**		**2016/2017**		**2017/2018**		**2018/2019**	
	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)
No. Reg	6691		6022		5641		5578		5563	
	3974 (59.4)	2717 (40.6)	4730 (78.5)	1292 (21.5)	4453 (78.9)	1188 (21.1)	4637 (83.1)	941 (16.9)	3922 (70.5)	1641 (29.5)

Table 2 revealed performance trend of students in Biology. The result showed that out of 6691 students that sat for the examination in 2014/2015 session, 3974 representing 59.4% had between A1-C6 in Biology. The result also showed that out of 6022 students in 2015/2016 session, 4730 representing 78.5% had between A1-C6. In 2016/2017 session, out of 5641 students that sat for the examination in Biology, 4453 representing 78.9% had between A1-C6. It was shown that in 2017/2018 session, out of the 5578 students that wrote Biology examination, 4637 representing 83.1% had between A1-C6 while the result revealed that out of 5563 who sat for Biology examination in 2018/2019 session, 3922 representing 70.5% had between A1-C6. This is depicted in figure ii;
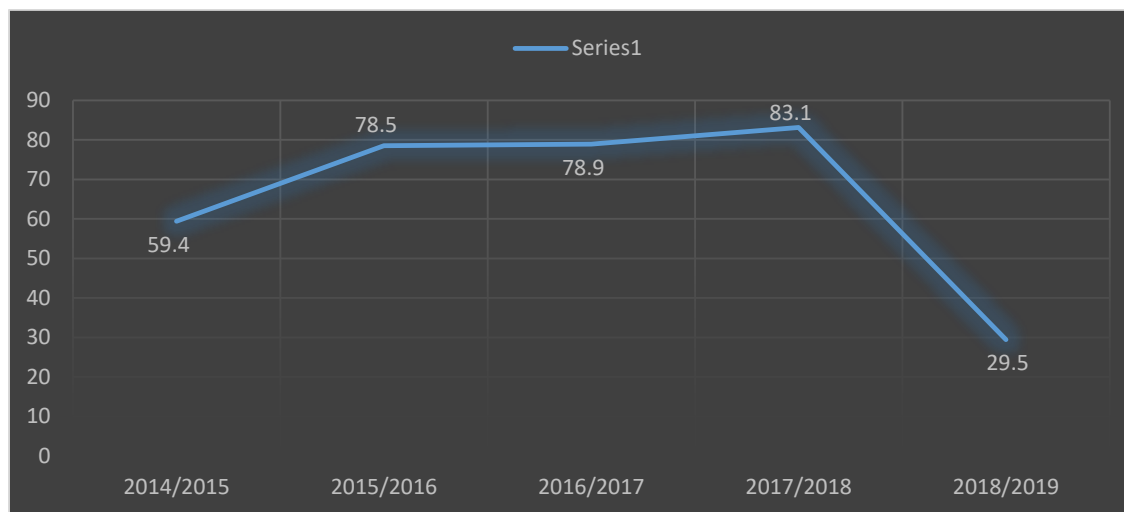
Figure ii: Performance trend of students in Biology

From figure ii, trend in performance of students in Biology does not follow an explicit pattern as there was an increase in the second year performance with a drop in the fifth year performance.

Research Question 3: What is the trend of students' performance in Physics in public secondary schools in Ekiti State?

Table 3: Performance trend of students in Physics

	2014/2015		**2015/2016**		**2016/2017**		**2017/2018**		**2018/2019**	
	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)
No. Reg	6069		5231		5250		4989		5014	
	2863 (47.2)	3206 (52.8)	4173 (79.8)	1058 (20.2)	2724 (51.9)	2526 (48.1)	4322 (86.6)	667 (13.4)	3386 (67.5)	1628 (32.5)

Table 3 revealed performance trend of students in Physics. The result showed that out of 6069 students that sat for the examination in 2014/2015 session, 2863 representing 47.2% had between A1-C6 in Physics. The result also showed that out of 5231 students in 2015/2016 session, 4173 representing 79.8% had between A1-C6. In 2016/2017 session, out of 5250 students that sat for the examination in Physics, 2724 representing 51.9% had between A1-C6. It was shown that in 2017/2018 session, out of the 4989 students that wrote Physics examination, 4322 representing 86.6% had between A1-C6 while the result revealed that out of 5014 who sat for Physics examination in 2018/2019 session, 3386 representing 67.5% had between A1-C6. This is depicted in figure iii;
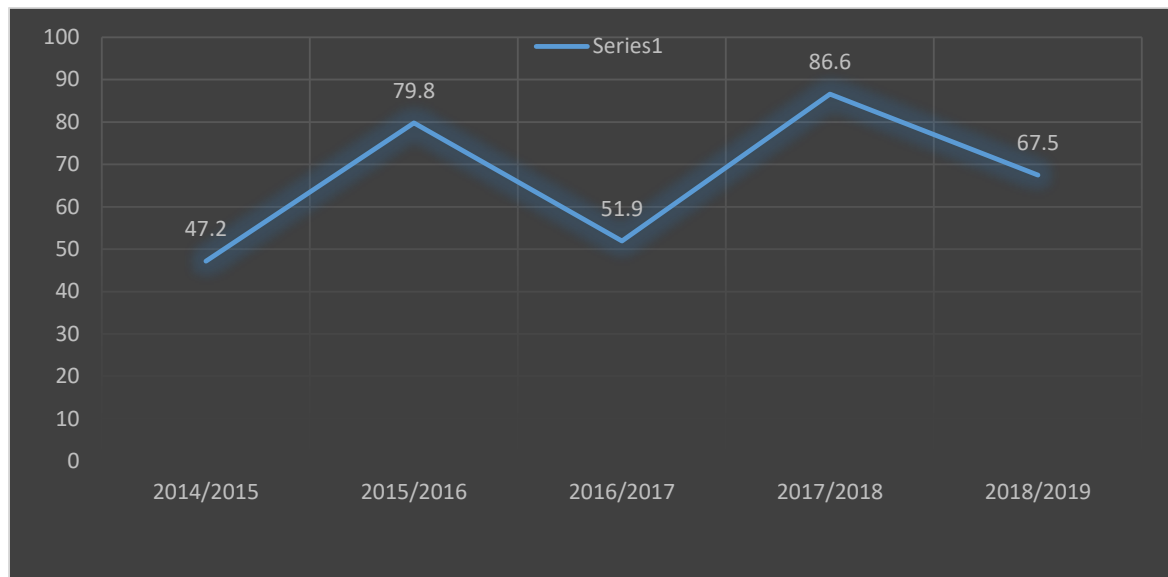
Figure iii: Performance trend of students in Physics

From figure iii, trend in performance of students in Physics does not follow a specific pattern as there was an increase in the second year performance, then a sharp reduction in the third year performance, then an increase in fourth year performance with a drop in the fifth year performance.

Research Question 4: What is the trend of students' performance in Chemistry in public secondary schools in Ekiti State?

Table 4: Performance trend of students in Chemistry

	2014/2015		2015/2016		2016/2017		2017/2018		2018/2019	
	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)	A1-C6 (%)	D7-F9 (%)
No. Reg	6072		5189		5258		5155		5034	
	4580 (75.4)	1492 (24.6)	4403 (84.9)	786 (15.1)	4894 (93.1)	364 (6.9)	3964 (76.9)	1191 (23.1)	3873 (76.9)	1161 (23.1)

Table 4 revealed performance trend of students in Chemistry. The result showed that out of 6072 students that sat for the examination in 2014/2015 session, 4580 representing 75.4% had between A1-C6 in Chemistry. The result also showed that out of 5189 students in 2015/2016 session, 4403 representing 84.9% had between A1-C6. In 2016/2017 session, out of 5258 students that sat for the examination in Chemistry, 4894 representing 93.1% had between A1-C6. It was shown that in 2017/2018 session, out of the 5155 students that wrote Chemistry examination, 3964 representing 76.9% had between A1-C6 while the result revealed that out of 5034 who sat for Chemistry

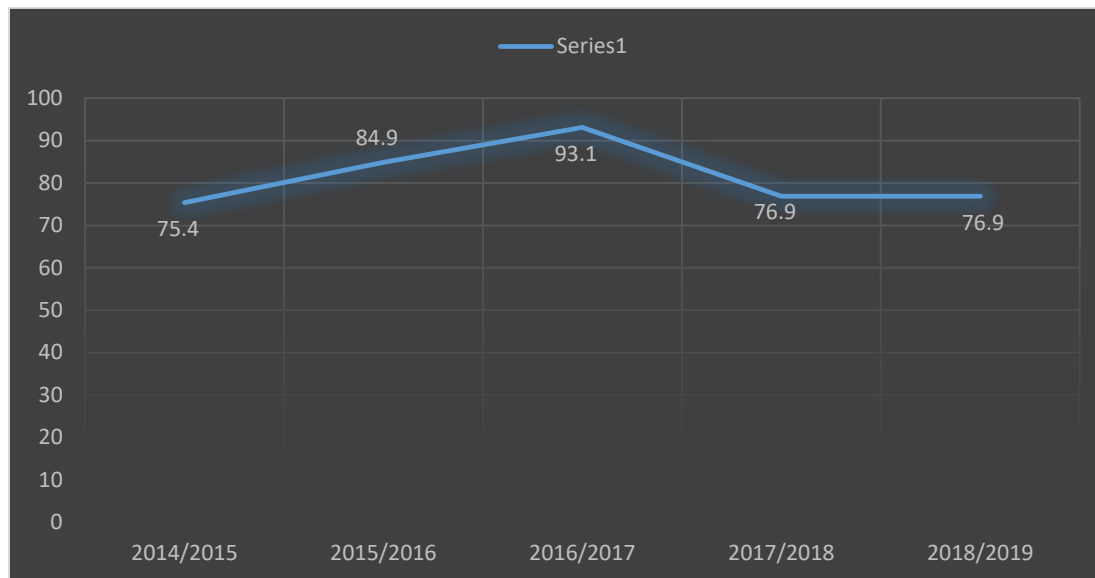examination in 2018/2019 session, 3873 representing 76.9% had between A1-C6. This is depicted in figure iv;

Figure iv: Performance trend of students in Chemistry

From figure iv, trend in performance of students in Chemistry follows almost a linear pattern as there was a steady increase in the second and third years' performance, then a slight reduction in the fourth year performance, then a constant rate of performance was maintained in the fifth year performance.

Research Hypothesis

H_o1: There is no significant difference in students' performance in the three science subjects in public secondary schools in Ekiti State.

Table 5: Analysis of Variance (ANOVA) computation for difference in students' performance in the three science subjects

Groups	SS	df	MS	F	Sig.
Between Groups	.711	1	87.062		
Within Groups	585.709	3	295.240	3.174[*]	.032
Total	586.42	4	56.800		

The result presented in table 5 showed that F-cal value of 3.174 is significant because the P value (0.032) < 0.05. Hence, the null hypothesis is not upheld. This implies that there is significant difference in students' performance in the three science subjects in public secondary schools in Ekiti State. In order to investigate the source of the differences observed, Post-hoc analysis (Scheffe) with mean difference was carried out.

Table 6: Post-hoc Analysis of Mean for differences in students' performance in the three science subjects

Groups		Biology	Physics	Chemistry
	Mean	3.2741	3.7244	4.2133
Biology	3.2741	0.1537*		
Physics	3.7244	0.1183	0.0531	
Chemistry	4.2133			

*p<0.05

In Table 6, a significant difference was found between the performance of students in Biology and Chemistry to the advantage of students in Chemistry. However, there was no significant difference between the performance of students in Biology and Physics. Also, there was significant difference between the performance of students in Chemistry and Physics. The result of Post-hoc test showed that students performed best in Chemistry, followed by Physics while they performed least in Biology.

DISCUSSION

The findings of the study revealed that students' performance in Chemistry was better than their performance in Physics and Biology in the five years under consideration. The findings of this study also revealed that the trend in performance of students in Biology, Physics and Chemistry does not follow a specific pattern as there was general increase in the second year performance and drop in the third year performance except in Chemistry. There was attendant increase in the fourth year performance and a constant decrease in the fifth year performance. The probable reason for the same pattern of trend in the three science subject could be as a results of school factor, teachers' factor, students' factor, parental factor, Government factor amongst others.

The study further revealed that there was significant difference in the students' performance in the three science subjects in public secondary schools in Ekiti State. A significant difference was found between the performance of students in Biology and Chemistry, as well as between the performance of students in Chemistry and Physics. However, there was no significant difference between the performance of students in Biology and Physics. The result of Post-hoc test also showed that students performed best in Chemistry, followed by Physics while they performed least in Biology.

CONCLUSION

Sequel to the findings of this study, there was no specific pattern in the performance of students in the three science subjects and the trend in performance does not follow any pattern. Also, there was difference in students' performance in the three science subjects in public secondary schools in Ekiti State as students performed best in Chemistry, followed by Physics while they performed least in Biology.

Recommendations

Based on the findings of this study, the following recommendations were made;

1. Government should try as much as possible to provide and equip schools laboratory with enough equipment and other facilities that make up a better laboratory.
2. Government should also support and encourage teachers by organizing training and workshop on science subjects and teaching methods from time to time in order to increase their performances.
3. Parents and other stakeholders of education should assist governments by contributing their own quota to schools.
4. In scheduling of time-table, enough periods should be allotted for both science subjects teaching and practical.

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