American Journal of Educational Science
Vol. 4, No. 4, 2018, pp. 127-135
http://www.aiscience.org/journal/ajes
ISSN: 2381-7127 (Print); ISSN: 2381-7135 (Online)

Two Innovative Teaching Strategies and Academic Performance of Senior Secondary School Students in Biology: Ekiti State Experience

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Abstract

This study investigated the effects of two innovative teaching strategies i.e. Kolawole's Problem Solving and the use of Lab-less Kit strategies on the academic performance of secondary school students in Biology in Ekiti-State. It also examined the interactive effects of gender and location on performance of students exposed to two strategies. The study adopted quasi–experimental pre-test/post-test research design. Two hundred and nine students were selected for the study. Kolawole's Problem Solving strategy and Lab-less kits were used as treatment. The instrument used for the study was Biology Achievement Test, Analysis of Variance, Analysis of Covariance and Post Hoc analysis were used to analyse data collected. The study revealed that there were significant difference between the mean pre-test and post-test score of the experimental groups and control group in which the experimental groups performed better; it also indicated no gender and location influence in the use of Kolawole's Problem Solving strategy and lab-less and students' performance. Based on the findings of the study, it is recommended among others that Government should provide Lab-less Kits to secondary schools in the State. Also, Biology teachers should be given adequate orientation through workshops and seminars to update their knowledge in the use of Kolawole's Problem Solving strategy and Lab-less Kit strategies in teaching.

Keywords

Kolawole Problem Solving Technique, Lab-Less Kits, Conventional Laboratory Technique

Received: June 25, 2018 / Accepted: July 23, 2018 / Published online: October 9, 2018

1. Introduction

1.1. Background to the Study

Nations all over the world, whether developed or developing recognizes the vital role of science and technology in national development. It is an undisputable fact that no nation can advance scientifically and technologically without a sound science education programme. It is on realization of this fact that the Federal Government of Nigeria in her National Policy on Education (2008) stated that the goals of science education in Nigeria shall be: "to produce scientists for national development; and to service studies in technology and the cause of technological development".

Biology is the science which studies living things and concerns itself with the study of the structure, behavior, distribution, the origin of plants and animals and their relationship with their environments. Like other science subjects in secondary schools, Biology comprised of practical activities. In all the sciences, Biology practical is geared towards simplifying the theoretical content, so as to enhance effective instruction and learning of the subject.

Practical work in science is very germane in the teaching of science, it stimulates and arouses learners' interest and

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promotes long term memory that theory alone cannot do. For this reason, it becomes obvious that there is an urgent and serious need to justify the exposition of the students to Biology practical activities as well as studying its effect on student's performance in Biology.

Despite the importance of Biology in the society, available statistics from West African Examination Council WAEC [1], [2], [3] on senior secondary school students' performance in Biology revealed that although Biology had the highest enrolment relative to other science subjects, it recorded very poor performance at senior school certificate examinations. The decline in performance of candidates in Biology in 2012 as gathered from Chief Examiners' report calls for check and balancing. The general comment on Biology practical revealed that the performance of candidates was slightly poorer than those of previous years. It has been observed that practical lessons are usually held few weeks to the final examination period Ureme [4]. With this approach, students are only hurriedly exposed to permutated practical questions that students are likely to attempt in the final examinations thereby leading to inadequate acquisition of basic skills on the part of the students and poor performance in their Senior Secondary School certificate examination.

The neglect of the practical aspect of Biology in schools has been blamed on such factors as the inability of the school authorities to provide materials and equipment for practical work and teachers' failure to recognize the importance of practical work in science teaching. Okafor [5] in his study noted that a sound theoretical and practical knowledge of Biology is needed for the management of our natural resources, provision of good health facilities, adequate food supply and favourable life environment. Thus, the teaching and learning of Biology has to be encouraged in the school. Biology laboratory equipment must not only be adequately provided in schools; but must be optimally utilized for effective teaching of Biology by Biology teachers and for meaningful learning of Biology by students.

In the light of the above, it should be a general concern of every Nigerian including the researchers to view this backwardness with some seriousness. Hence, it became expedient to look into the issue of teaching and learning of the core science subjects – Biology and others. However, the focus of this study is to consider the effects of KPS and Lab-less Kits on the academic performance of secondary school students in Biology and to investigate the interactive effect of gender and location on academic performance of students exposed to KPS and Lab-less kits.

In order to ascertain the objective of this study, the following research questions were designed thus:

Which of the strategies (KPS, Lab-less Kits or Conventional laboratory) would be the most effective in the teaching of Biology?

What are the performance of students in Biology exposed to KPS, Lab-less Kits and Conventional laboratory method?

1.2. Research Hypotheses

In an attempt to find solutions to the questions raised above, the following null hypotheses were generated for this study.

H_{01}: There is no significant difference in the pre-test mean score of students exposed to KPS, Lab-less Kits and Conventional laboratory.

H_{02}: There is no significant effect of students' exposure to KPS, Lab-less Kits and Conventional laboratory on their academic performance in Biology.

H_{03}: There is no significant difference in the post-test mean score of students exposed to KPS, Lab-less Kits and Conventional laboratory.

H_{04}: There is no significant interactive effect of gender on the academic performance of students exposed to KPS.

H_{05}: There is no significant interactive effect of gender on the academic performance of students exposed to Lab-less Kits.

H_{06}: There is no significant interactive effect of location on the academic performance of students exposed to KPS.

H_{07}: There is no significant interactive effect of location on the academic performance of students exposed to Lab-less Kits.

2. Conceptual Mapping of Innovative Teaching Strategies

Biologists usually study all forms of life including ourselves, other animals, plants and microscopic living things such as bacteria which is too small to be viewed without microscope. Biology is needed in medicine, nursing, pharmacy, food technology and others. There are series of innovative strategies that could be used in familiarizing the students with practical works, in other to improve their academic performance but the two innovative strategies this research is interested in are Kolawole's Problem Solving strategy (KPS) and the use of Lab-less Kits.

According to Nwosu [6], the failure to organize practical work for student by their Biology teachers can be attributed to unavailability of Biology laboratory equipment, absence of Biology laboratory, poor motivation on the part of Biology teachers and Biology teachers' deficiency in practical skills required to put the available Biology laboratory equipment into productive use. In order to improve students'

performances and arouse their interest, students have to be taught Biology with hands-on and different learning materials so as to enable them acquire the cognitive competence and skills of Biology that they need in passing biology examinations Okafor [5]. Thus, researchers through the advancement in technology were able to improvise an innovative lab-less or ready-to-use concept as alternative to Conventional laboratory. According to Ottander and Greisson [7], the main purpose of laboratory in science education is to provide students with conceptual and theoretical knowledge to help them learn scientific concepts and through scientific methods, to understand the nature of science.

Laboratory work also gives the students the opportunity to experience science by using scientific research procedures. In order to achieve meaningful learning, scientific theories and their application methods should be experienced by students. Moreover, laboratory work should encourage the development of analytical and critical thinking skills and encourage interest in science.

Ready-to-use science equipment also known as Lab-less Kit is to provide science teachers with an empowering tool to help them increase learners' motivation, curiosity, interest, thinking skills and understanding. The Lab-less Kits was designed to enable experiments to be performed without the need for laboratory facilities, electricity or running water and demonstrations and can be performed anywhere even outdoors according to Science Demo Limited. The characteristics of Ready-to-use experiments or Lab-less Kits include:

1. creation of an exciting phenomenon within minutes, leading to an inquiry guidelines and background information, including Questions and Answers for teachers and video manuals
2. Most kits are reusable
3. Refills are available
4. Easy to use and safe
5. Kits are modular and can fit all science curricula
6. Kits can be used anywhere
7. No running water or electricity is needed.

Kolawole's Problem Solving Teaching Technique is an innovative method of teaching aimed at formulating a practical and meaningful approach to classifying questions according to level of thinking or ability level they require from students, in contrast to content or subject matter of the needed knowledge.

Kolawole [8] postulated a comprehensive easy-to-use problem-solving method called; Kolawole's Problem-Solving (KPS) method which by design deliberately takes care of: (i) Teaching (i.e. Content versus Behavioural Objective for the teacher) (ii) Learning (i.e. Content versus Behavioural Objectives (Passwords) for students) and (iii) Evaluation Process or blueprint (i.e. Taxonomy of Educational Objectives, which incorporates content versus (Passwords/Behavioural Objectives for both teachers and students illustrative verbs). The unique feature of KPS method is that the teacher can use it for teaching learning and evaluating the students. In this regard, the KPS method involves a combination of content, teacher's activities, student's activities and evaluation that could be operated concurrently (or simultaneously)

Kolawole classified KPS into five – step problem solving method as follows:

1. Identification of keywords, terms and terminologies, passwords and their respective Domains
2. DIRECT each of the IKTT of the problem/topic
3. DEVECQUIT3 each of the IKTT of the problem/topic
4. S3C3RIPT3 each of the IKTT of the problem/topic
5. APPRAISE each of the IKTT of the problem/topic

It is important for teachers and students to understand the concept of Biology because of some characteristics the subject possesses. Njoku [9] opined that one of the factor or challenges militating against good performance of students in Biology is their inability to recall the major facts (concept). It is important for students to have the ability to recall Biology facts, as this would help the students to solve or answer questions in Biology. Many educators believe that a child who studies Biology under a competent teacher using the appropriate method, would not only be able to answer biological questions as well as a child trained in the traditional manner, but would also be far ahead in understanding and in preparation for advanced Biology.

As mentioned earlier, the importance of language in understanding Biology cannot be left out. Like any other profession, Biology also has its own technical term. Biology employs scientific terms to describe various parts of living things. In some cases, a word in general usage has different and specific meanings with Biology. Most students have problems in comprehending these biological and scientific languages. Njoku [9] pointed out that to comprehend biological language is another factor affecting students' performance in Biology. Biology as a subject has a special language which is different from English language. Njoku [10] affirmed that this special language is understood only by those who study the subject. That is the reason why language ability level may be very essential in teaching and learning Biology. The appraisal level is the level at which the teacher apply the topic to everyday life issues. Njoku [9] opined that

students fail Biology practical because of their inability to applies the knowledge acquired from the topic to familiar and unfamiliar situations; relate given concepts to others; analyze, induce (or deduce), synthesize and evaluate concepts that underlie the topic in order to solve problems.

In Nigeria the students at the pre-primary, primary and higher institutions are mixed with boys and girls. But at secondary school level, many schools grouped the girls in one school, boys in one school, and some have both boys and girls in one school. According to Adesoji [11] gender has great influence on the students' performance and that boys perform better than girls in Biology.

Also Akusoba and Okafor [12] discovered mixed gender group achieved higher than each of the male and female group. The higher mean difference recorded by the mixed gender group may be explained by the fact that high and low ability students obtain higher performance scores after learning in mixed gender group. They maintained that as much as possible, mixed gender classes should be adopted in all science practical classes. Comparing the superiority of one gender group to the other, Okafor [5] observed that students in single sex school performed better than students in mixed school.

In Nigeria today, society, parents and students seem to associate better performance and achievement in Biology to a variety of factors for which school location is inclusive. School location simply describes the settlement or area in which a school is situated. This settlement could either be urban or rural. Student achievement may be influenced by the area in which the students live or where the school is situated. Eule and Chukwu [13] asserted that the reasons for variation in Biology achievement can be as a result of geographic location of school, resources, availability of technology and quality of teachers. Also Asiyai [14] stated that school buildings, classroom housing the students, the physical and environmental conditions could determine students' achievement in Biology.

3. Methodology

3.1. Instrumentation

This study adopted the quasi – experimental pre-test and post-test three group design (two experimental groups and one control group), the three groups were administered a pre-test before treatment and post-test after treatment. The experimental groups were subjected to treatment using KPS and Lab-less kits and the control group was taught using conventional laboratory method. The pattern of the design is as shown below:

O_1 X_1 O_2: Experimental group (1) KPS

O_3 X_2 O_4: Experimental group (2) Lab-less kits

O_5 C O_6: Control group

The instrument used for this study was Biology Achievement Test in Biology (BAT) designed by the researcher. The study used two innovative strategies i.e. Kolawole Problem Solving (KPS) and Lab-less kits strategies. The students in groups I and II were taught using kolawole problem solving (kps) and lab-less kits strategies, last group III were exposed to conventional laboratory strategy for six consecutive weeks.

The data generated from the pre-test and post-test scores of the students were subjected to statistical analysis using Analysis of Covariance (ANCOVA), Analysis of variance (ANOVA) and Scheffe post-hoc analysis.

3.2. Participants

Two hundred and nine (209) students drawn from six public secondary schools in Ekiti State were the respondents. Intact classes were selected from the sample schools; 52 students from school A, 22 students from school B, 33 students from school C, 31 students from school D, 42 students from school E, 19 students from school F.

4. Presentation of Result

Resultants

Hypothesis 1: There is no significant difference in the pre-test mean score of students exposed to KPS, Lab-less Kits and Conventional laboratory methods.

Table 1. Analysis of Covariance (ANCOVA) for students exposed to KPS, lab-less and Conventional before treatment.

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.409[a]	2	.704	1.368	.257	.013
Intercept	14153.586	1	14153.586	27476.849	.000	.993
Groups	1.409	2	.704	1.368	.257	.013
Error	106.113	206	.515			
Total	14577.000	209				
Corrected Total	107.522	208				

a. R Squared =.013 (Adjusted R Squared =.004) * P<0.05

b. Source: Extraction from SPSS output

Table 1 above shows that the P-value = 0.257>0.05, this means that the null hypothesis is not rejected at α = 0.05. Hence, there is no significant difference in the pre-test mean score of students exposed to KPS, Lab-less Kits and Conventional laboratory. This shows that the three groups were homogeneous at the commencement of the experiment.

Hypothesis 2: There is no significant effect of students' exposure to KPS, Lab-less Kits and Conventional laboratory on their academic performance in Biology

Table 2. Analysis of Covariance (ANCOVA) for Pre – test and Post – test Mean Scores of Students under the Groups.

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.141[a]	5	1.428	2.888	.015	.066
Covarite	27.905	1	27.905	56.433	.000	.218
Groups	5.049	2	2.525	5.106	.007	.048
Posttest	1.327	1	1.327	2.683	.103	.013
pretest * posttest	5.219	2	2.609	5.277	.006	.049
Error	100.380	203	.494			
Total	14577.000	209				
Corrected Total	107.522	208				

a. R Squared =.066 (Adjusted R Squared =.043)
b. Source: Extraction from SPSS output

Table 2 shows that P= 0.006<0.01<0.05 which means that there is a strong evidence to reject the null hypothesis. Hence, there is significant effect of students' exposure to KPS, Lab-less Kits and Conventional laboratory on their academic performance in Biology.

In order to investigate the direction of the differences observed in the pre – test and post - test among the groups, mean difference was carried out in table 3 below

Table 3. Mean difference between the pre-test and post-test scores of students exposed to KPS, Lab-less Kits and Conventional laboratory.

Groups	Test	N	Mean	Mean Diff.
KPS	Pre Test	84	27.97	51.59
	Post Test	84	79.56	
Lab-less	Pre Test	64	27.81	44.90
	Post Test	64	72.71	
Conventional	Pre Test	61	27.32	31.83
	Post Test	61	59.45	
Total		209		

Source: Extraction from SPSS output

From the Table 3, it is shown that the mean difference in students' performance in Biology between pre-test and post-test scores for KPS is 51.59%, Lab-less Kits is 44.90% and Conventional method is 31.83%. The use of KPS, Lab-less Kits and Conventional laboratory method influences students' performance in Biology with KPS being the most effective method in the teaching of Biology.

Hypothesis 3: There is no significant difference in the post-test mean score of students exposed to KPS, Lab-less Kits and Conventional laboratory

Table 4. Analysis of Variance (ANOVA) for post – test mean scores of students under the groups.

Sources	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1296.483	2	648.241	526.423	.000
Within Groups	253.670	206	1.231		
Total	1550.153	208			

Source: Extraction from SPSS output

Table 4: shows that P= 0.000<0.01<0.05 which means that there is a strong evidence to reject the null hypothesis. Hence, there is significant difference in the post-test mean scores of students exposed to KPS, Lab-less Kits and Conventional laboratory methods.

In order to investigate the direction of the differences observed, Scheffe Post-hoc test with mean difference was carried out

Table 5. Scheffe Post – hoc test and mean difference for observed difference in students' performance in the groups.

Groups	Mean Diff.	KPS	Lab-less	Conventional
		79.56	**72.71**	**59.45**
KPS	79.56			
Lab-less	72.71	6.85*		
Conventional	59.45	20.11*	13.26*	

* P < 0.05
Source: Extraction from SPSS output

In table 5, a significant difference was found between KPS and lab-less in favour of KPS Also there was significant difference between KPS and Conventional laboratory in favour of KPS There was difference between lab-less and Conventional in favour of lab-less. The result of post – hoc analysis also showed that students exposed to KPS performed significantly better than their counterparts in other two groups. Also, those exposed to lab-less performed better than those in Conventional laboratory. These further justified the differences observed.

Hypothesis 4: There is no significant interactive effect of gender on the academic performance of students exposed to KPS.

Table 6. Analysis of Covariance (ANCOVA) for interactive effect of gender on academic performance of students exposed to KPS.

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.857[a]	1	.857	.830	.365	.010
Intercept	47768.191	1	47768.191	46244.233	.000	.998
Gender*KPS	.857	1	.857	.830	.365	.010
Error	84.702	82	1.033			
Total	47943.000	84				
Corrected Total	85.560	83				

a. R Squared =.010 (Adjusted R Squared = -.002)
b. Source: Extraction from SPSS output

From Table 6, the P- value =0.365>0.05. The null hypothesis is not rejected. This implies that there is no significant interactive effect of gender on the academic performance of students exposed to KPS.

Hypothesis 5: There is no significant interactive effect of gender on the academic performance of students exposed to Lab-less Kits

Table 7. Analysis of Covariance (ANCOVA) for interactive effect of gender on academic performance of students exposed to Lab-less Kits.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig. (P)	Partial Eta Squared
Corrected Model	5.741[a]	1	5.741	.480	.490	.006
Intercept	81598.850	1	81598.850	6828.727	.000	.988
Gender*Lab-less Kits	5.741	1	5.741	.480	.490	.006
Error	740.838	62	11.949			
Total	85072.000	64				
Corrected Total	973.639	63				

a. R Squared =.006 (Adjusted R Squared = -.006)
b. Source: Extraction from SPSS output

Table 7 shows that the P-value = 0.490 >0.05 Hence, the null hypothesis is not rejected. This means that there is no significant interactive effect of gender on the academic performance of students exposed to Lab-less Kits.

Hypothesis 6: There is no significant interactive effect of location on the academic performance of students exposed to KPS.

Table 8. Analysis of Covariance (ANCOVA) for interactive effect of location on academic performance of students exposed to KPS.

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.165[a]	1	.165	.159	.691	.002
Intercept	45103.308	1	45103.308	43310.552	.000	.998
Location*KPS	.165	1	.165	.159	.691	.002
Error	85.394	82	1.041			
Total	47943.000	84				
Corrected Total	85.560	83				

a. R Squared =.002 (Adjusted R Squared = -.010)
b. Source: Extraction from SPSS output

Table 8 shows that the p-value = 0.691 >0.05. The null hypothesis is not rejected. This implies that there is no significant interactive effect of location on the academic performance of students exposed to KP.

Hypothesis 7: There is no significant interactive effect of location on the academic performance of students exposed to Lab-less Kits

Table 9. Analysis of Covariance (ANCOVA) for interactive effect of location on academic performance of students exposed to Lab-less Kits.

Source	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.097[a]	1	1.097	.638	.428	.010
Intercept	30409.097	1	30409.097	17677.556	.000	.997
Location*Lab-less	1.097	1	1.097	.638	.428	.010
Error	106.653	62	1.720			
Total	30558.000	64				
Corrected Total	107.750	63				

a. R Squared =.010 (Adjusted R Squared = -.006)
b. Source: Extraction from SPSS output

Table 9 shows that the p-value = 0.428 >0.05. Hence, the null hypothesis is not rejected. This means that there is no significant interactive effect of location on the academic performance of students exposed to Lab-less Kits.

5. Discussion of Findings, Conclusion and Recommendations

5.1. Discussion of Findings

The findings of the study revealed that KPS, use of Lab-less Kits and Conventional laboratory influences students' performance in Biology with KPS having the highest effect. It shows that KPS strategy has an effect on students' performance in Biology. This finding agrees with that of Kolawole [15] that KPS strategy would lead to good performance in Science. The importance of KPS is especially apparent in the composing behaviour of Biology students as supported by Kolawole [15]. Also, findings revealed that Lab-less Kit strategy influences students' performance in Biology. It is interesting to note that the findings of the present study is not different from the findings of Okafor [5] and Ajayi [16] whose study reported that Lab-less Kits positively affect students' performance in Biology.

The findings also revealed a significant main effect on the academic performance of students among the three groups. There is a significant difference between KPS and Lab-less Kits; KPS and Conventional laboratory; and between Lab-less Kits and Conventional laboratory. This shows a gap between KPS, Lab-less Kits and Conventional laboratory at enhancing student' performance in Biology. These results aligned with that of Kolawole [15] whose study observed that KPS strategy proved more effective in enhancing students' academic achievement in KPS. Further, result showed a significant (large) difference in the pre-test and post-test scores of students in Biology among the groups especially KPS and Lab-less Kits.

Findings of the study also revealed that a significant difference exists in the post-test mean scores of students in Biology among the three groups (KPS, Lab-less Kits and Conventional laboratory). This is evident from the fact that students' performance varies from KPS, Lab-less Kits and Conventional laboratory. The findings showed that students in the KPS group performed better than those in Lab-less Kits and Conventional methods while students in Lab-less Kit group performed better than their counterparts in the Conventional laboratory. This agrees with Seweje [17] that good teaching strategies have the ability to improve cognition of students. This also justifies the earlier postulate of this study that KPS and Lab-less Kits could facilitate meaningful learning of Biology.

As life is essentially dynamic, likewise our instructional strategy needs to reflect on the dynamic nature of society and human needs. Modern and learner centered strategies like KPS and Lab-less Kits are essential for effective teaching and learning. It should equally be noted that the quality of teaching and learning is a viable parameter that determines the academic performance of students in Biology and successful implementation of Biology curriculum in Senior Secondary Schools.

The findings from hypotheses on gender difference between the experimental groups showed no significant difference. This means that gender has nothing to do with students' response to the use of any of the instructional strategy i.e. KPS and Lab-less Kits. The findings agreed with that of Kolawole [8] who observed that gender has no interactive effect on students' academic performance exposed to KPS But the findings contradicted the report of Okafor [5], Ajayi [16] whose study stated that male perform better than female in Biology when exposed to Lab-less Kits.

Likewise the findings from hypotheses on location difference between the experimental groups showed no significant

difference. This means that location has nothing to do with students' response to the use of any of the instructional strategy i.e. KPS and Lab-less Kits. The findings revealed that students in urban schools have the same achievement in Biology when taught using the KPS and Lab-less Kits as compared to students in rural schools. The findings of this research supported the conclusion of Kolawole [15], Kolawole and Ajetomobi [18] whose studies suggested that a significant difference does not exist between students' academic performance in Biology in rural and urban schools. But the result contradicted the findings of William [19] whose study opines that students from urban schools perform better than those in rural schools because of the level of federal funding and socio-economic background.

In conclusion therefore, KPS and Lab-less Kits would help in improving students' academic performance in Biology and adoption of positive attitude in one's ideology and persistence towards achieving a resounding academic success, generally. The study has shown that there is no aspect of Biology that should be considered difficult, so long as the teachers can apply KPS appropriately and effectively and remain focused.

5.2. Conclusion

This study has shown that the two innovative teaching strategies (KPS and Lab-less Kits) were effective in improving the academic performance of secondary school students' in Biology in Ekiti State. KPS is the most effective; followed by Lab-less Kits followed by Conventional laboratory respectively. The use of KPS helped the students to achieve maximally in Biology during teaching. There are no gender and location disparity in the student responses to KPS and Lab-less strategies of teaching Biology.

5.3. Recommendations

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

1. The use of KPS and Lab-less Kit strategies should be encouraged in Biology class in secondary schools.
2. Biology teachers should be given adequate orientation through workshops and seminars to update their knowledge in the use of KPS and lab-less strategies in teaching.
3. Government should provide Lab-less Kits and supply the kits to all secondary schools.
4. Teachers should focus on the appropriate strategies to improve students' performance in Biology. They should also be made to undergo refresher courses where they can learn the new technical-know-how of teaching Biology.
5. Teachers should manage the time allocated well in order to accommodate the use of KPS and Lab-less Kit strategies in teaching Biology.

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