

Effect of Kolawole's Problem Solving On Academic Performance of Senior Secondary School Students in Biology in Ondo State, Nigeria

AUTHOR(S): AKINWUMI, Ibukun Omolara

Abstract

The study examined the effect of Kolawole's Problem Solving (KPS) on the academic performance of senior secondary school students in Biology in Ondo State, Nigeria. This study adopted a pre-test, post-test, control group quasi experimental design. The population of the study comprised all S.S.S. 2 students offering Biology in all the public secondary schools in Ondo State, Nigeria. The sample consisted of class intact size (students offering Biology) drawn from 4 public secondary schools in Ondo State. The sample was selected using multistage sampling procedure. Achievement Test in Biology (ATB) was used for collecting the data for the study. Initially, 70 test items were prepared on the selected concepts but later reduced to 40 test items. The test was given to experts in test and measurement, and amendments were made according to their suggestions. Internal consistency method was used to determine the reliability of the instrument while the data collected were analysed using Cronbach Alpha which yielded reliability co-efficient value of 0.84. The data collected through the instruments were analysed using descriptive and inferential statistics. The findings of the study revealed that the use of Kolawole's Problem Solving (KPS) strategy positively enhance students' academic performance in Biology than the conventional strategy. The study further revealed that Kolawole's Problem Solving (KPS) strategy is not location biased. It was recommended among others that authors of Biology textbooks should adopt Kolawole's Problem-Solving (KPS) strategy five steps in developing all chapters of their book.

Keywords: Kolawole's Problem Solving (KPS), Academic Performance, Biology,

IJARBAS

Accepted 25 December 2021
Published 31 December 2021
DOI: 10.5281/zenodo.5813523

About Author

Author(s):

AKINWUMI, Ibukun Omolara

Department of Science Education,
Bamidele Olumilua University of Education, Science and Technology,
Ikere – Ekiti, Nigeria.

E-Mail: akinwumi.ibukun@bouesti.edu.ng



Introduction

Science is the foundation that offers sustainable development to a nation by protecting human societies from lack of knowledge and information, illiteracy, disease and poverty. The development of any nation virtually depends to a great extent on its technological and scientific advancement. Science Education could, therefore, be regarded as a veritable tool for scientific and technological advancement of any nation. This fact is enshrined in the National Policy on Education by the Federal Republic of Nigeria (FRN, 2014) where it states that science education should among other things equip students to live effectively in the modern age of science and technology for the purpose of socio-economic and political development. The policy also emphasizes that science teaching and learning are viable instruments for inculcating necessary scientific knowledge, skills and competencies.

In Nigeria, the Secondary School Biology Curriculum is designed to deepen students' understanding and interest in the biological sciences, and to encourage students' ability to apply scientific knowledge in personal health, community-health and agriculture among others (Federal Ministry of Education, 2009). Biology is offered at the Senior Secondary School (senior secondary school One (S.S.S 1) to senior secondary school three (S.S.S 3) classes) as a single subject. This group of students must have offered Basic Science and Technology at the Junior Secondary School (J.S.S 1 – 3) which is aimed at preparing them for core science subjects at the Senior Secondary level.

Despite the importance of Biology, the Senior Secondary School Biology results of Ondo State between 2010 and 2019 were also generally not encouraging as shown in Table 1.

Table 1: Statistical Data of WAEC Performance of Secondary School Students in Biology for the Year 2010-2019

Exam Year	No of Registered Students			% passed A1 – C6	% failed D7 – F9
	Total	M	F		
2010	9683	4934	4749	35	65
2011	11144	5012	5532	32	68
2012	9239	4560	4679	39	61
2013	9043	4374	4669	29	71
2014	9829	4897	4932	35	65
2015	10072	4858	5214	39	61
2016	9189	4495	4694	43	57
2017	9258	4347	4911	44	56
2018	9312	4456	4856	42	58
2019	10141	4689	5452	46	54

Source: Ondo State Ministry of Education.

It has been observed that among the determinant factors to enhance students' performance in Biology is the ways or methods through which teaching is conveyed to the learners. Conventional instructional strategy is an approach that places no emphasis on students constructing their own ideas and does not emphasize stepwise solution process (Robert, 2009). The method does not encourage skill acquisition needed for proper understanding of biological principles, concepts and facts because the students only pay attention while the teacher does all the talking. One of the additional emerging methods is the Kolawole's Problem-Solving (KPS) method which had been internationally published and globally certified for usage by leading education experts across the globe (Kolawole, 2013; Olofin and Kolawole, 2020).

The Kolawole's problem-solving teaching strategy is an innovative method of teaching any school subject. Kolawole (2013) postulated a comprehensive easy-to-use problem-solving method called *Kolawole's Problem-Solving (KPS) method* which by the design deliberately takes care of: (i) *Teaching* (that is, Content versus Behavioural Objective for the teacher) (ii) *Learning* (that is, Content versus Behavioural Objectives for students) and (iii) *Evaluation Process or Blueprint* (that is, Taxonomy of Educational Objectives, which incorporates content versus illustrative verbs). According to Kolawole and Olofin (2017a), the unique feature of KPS strategy is that the teacher can use it for teaching and evaluating the students. In this regard, the KPS strategy involves a combination of content, teacher's activities, student's activities and evaluation that could be operated concurrently (or simultaneously).

It is important for teachers and students to understand the concept of Biology because of some characteristics that the subject possesses. The importance of language in understanding Biology cannot be over-emphasized because, like any other discipline, Biology also has its own technical terminologies. 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. Ariyo (2017) opined that one of the 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 biological 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 conventional manner, but would also be far ahead in understanding and in preparation for advanced Biology.

Ariyo (2017) pointed out that language is another critical factor affecting students' performance in Biology and that the special language of Biology can only be understood 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 applies the topic to everyday life issues. Ariyo (2017) opined that students fail Biology because of their inability to apply 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.

Therefore, the present study investigates the effect of Kolawole Problem Solving (KPS) on the academic performance of senior secondary school students in Biology in Ondo State, Nigeria. The study specifically examined:

1. student's performance in Biology before and after exposure to Kolawole's Problem Solving (KPS) in Biology;
2. significant difference between the performance of students in Biology exposed to Kolawole's Problem Solving (KPS) strategy and the Control Group (COG);
3. difference between the pre-test and post-test mean score of students exposed to Kolawole's Problem Solving (KPS) strategy; and
4. difference in the academic performance of students exposed to Kolawole's Problem Solving (KPS) and the Control Group (COG) based on location.

Research Questions

The following research questions were raised to guide the study:

1. What is the student's performance in Biology before and after exposure to Kolawole's Problem Solving (KPS) in Biology?

2. Will there be any difference in the performances of rural and urban students in Biology after treatments with Kolawole's Problem Solving (KPS) and the Control Group (COG)?

Research Hypotheses

The following null hypotheses were generated for this study.

1. There is no significant difference between the performance of students in Biology exposed to Kolawole's Problem Solving (KPS) strategy and the Control Group (COG).
2. There is no significant difference between the pre-test and post-test mean score of students exposed to Kolawole's Problem Solving (KPS) strategy.
3. There is no significant difference in the academic performance of students exposed to Kolawole's Problem Solving (KPS) and the Control Group (COG) based on location.

Literature Review

Biology is one of the fields in the natural sciences that studies living things. The word 'Biology' is coined from two Greek words; Bios meaning life, and logy (logia) which means study (Ezemoka, 2011). Thus the concept Biology is concerned with the study of life. Biology can be defined as the science of life (Ariyo, 2017). It is a science subject offered in all the senior secondary schools in Nigeria, and it is a core subject for the science students. Elechi (2010) reported that, the teaching of Biology is important because, it helps the students to comprehend the world around them and equips them with necessary skills to build a progressive society. Biology is the branch of science that studies life using inquiry methods and discoveries, hence Ezemoka (2011) stated that since Biology involves inquiry and discovery, inquiry should be the central theme in Biology teaching and learning so that students can experience the world of life around them and actually do Biology as opposed to learning Biology.

Biology is one of the science subjects that senior secondary students offer in senior secondary certificate examinations in Nigeria (FRN, 2013). Interestingly, it is a popular subject among students and its popular nature among other science subjects has made it a distinct choice for all students (Lawal, 2011). Biology is a very important science subject and a requirement for further studies of other science related professional courses such as medicine, agriculture, pharmacy, biotechnology, genetic engineering, etc. Biology is the key to economic, intellectual, sociological, human resource development and well-being of any society. It is of importance in many ways for both individual and societal development as seen in biotechnology and genetic engineering (Lawal, 2011). Based on these assertions on the importance of biology, there is need for it to be properly taught in the secondary schools to improve students' performance in the subject.

Kolawole Problem-Solving (KPS) method by its peculiar design takes care of the possible teaching and learning problem. The most unique feature of KPS method is that while the teacher can use it for teaching and evaluating the students (Kolawole, Oladosu & Ajetunmobi, 2013), the learner can also simultaneously use it for learning and evaluating himself (or herself) (Olofin and Kolawole, 2020; Kolawole and Olofin, 2017b).

KPS is a five steps method which maps the content with the PASSWORDS or behavioural objectives or action verbs to solve, teach, learn, and evaluate for effective teaching. The teacher must have good mastery of the content or subject matter which Kolawole breaks the topic/subject matter/content into Keywords, Terms and Terminologies or the sub-topics of the subject matter (Olofin and Falebita, 2020). These terms and terminologies are also broken into 3 P.K which are as follows:

- a. P.K₁ = Past/Previous Knowledge

- b. P.K₂ =Present knowledge
- c. P.K₃ =Post-hoc Knowledgea.

P.K₁: Past or previous knowledge include background and prerequisite knowledge that are required to give solid foundation for the solution of learning, teaching and evaluating of the problem with appropriate Password. This past or previous knowledge need to be revised before the present knowledge is imparted.

b. P.K₂: Present knowledge is the new topic to be taught. So all relevant and core Keywords, Terms and Terminologies, components of the topic must be well spelt out with their appropriate and corresponding Password.

c. P.K₃: The Keywords, Terms and Terminologies of the new topic must be applied to everyday problem where possible leads to summary of findings, recommendations, conclusion and suggestion for further studies for future use.

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

- a. Identifies the Problem/Topic: Identify all relevant Keywords, Terms, Terminologies (KTT) of the problem/Topic. In the first step of KPS, breaking of the subjects matter into relevant Keywords (K), Terms (T), Terminologies (T) [IKTT] of the problem/topic or appropriate action/passwords are identified.
- b. DIRECT the Problem/Topic: At this stage, the teacher DIRECT the problem/topic via **D,I²,R³,E,C²,T²**, (that is, **Define, Identify, Indicate Recognise, Relate, Regulate, Enumerate, Categorize, Classify, and Treat, Terminologies**). The teacher teaches the students how to Define, Identify, Indicate Recognise, Relate Regulate, Enumerate, Categorize, Classify and Treat all Identified Keywords (K), Terms (T), Terminologies (T) [IKTT] of the problem/topic or equivalent verbs or synonyms of the problem/topic
The student at this level should be able to define, identify, indicate recognise, relate, regulate, enumerate, categorize, classify and treat all relevant terms, terminologies, sign, symbol, concepts, and others. In evaluating the students, Teacher ask questions on how to **Define, Identify, Indicate Recognise, Relate Regulate, Enumerate, Categorize, Classify and Treat All Identified Keywords (K), Terms (T), Terminologies (T) [IKTT]** of the problem/topic or equivalent verbs or synonyms of the problem/topic.
- c. DEVECQUIT the Problem/Topic: This third step of KPS is the level at which the teacher **D,E,V,E,C³,Q²,U,I,T²** the problem/topic i.e. **Discuss, Explain, Verify, Expatriate, Criticize, Compose, Compare, Query, Quit, Understand, Inquire, Transform, Test**. The teacher teaches the students how to Discuss, Explain, Verify, Expatriate, Criticize, Compose, Compare Query, Understand, Inquire, Transform all Identified Keywords (K), Terms (T), Terminologies (T) [IKTT] of the problem/topic or equivalent verbs or synonyms of the problem/topic. In evaluating the students, the teacher asks questions on how to Discuss, Explain, Verify, Expatriate, Criticize, Compose, Compare Query, Understand, Inquire, Transform all Identified Keywords (K), Terms (T), Terminologies (T) [IKTT] of the problem/topic or equivalent verbs or synonyms of the problem/topic.
- d. SCRIPT out the Problem/Topic: This fourth step in KPS is the level at which the teacher **S³,C³,R,I,P,T³** the topic i.e. **Solve, Simplify, Sketch, Calculate, Compute, Construct, Read, Interpret, Plot, Tabulate, Transform Test**. The teacher teaches the students how to Solve, Simplify, Sketch, Calculate, Compute, Construct, Read, Interpret, Plot, Tabulate and Transform All Identified Keywords (K), Terms (T),

Terminologies (T) [IKTT] of the problem/topic or equivalent verbs or synonyms of the problem/topic.

In evaluating the students, Teacher ask questions on how to Solve, Simplify, Sketch, Calculate, Compute, Construct, Read, Interpret, Plot, Tabulate and Transform all Identified Keywords (K), Terms (T), Terminologies (T) [IKTT] of the problem/topic or equivalent verbs or synonyms of the problem/topic.

- e. APPRAISE the Problem/Topic: The last step of KPS is the level at which the teacher ‘**APRAISE**’ the topic i.e. **Apply, Preview, Predict, Review, Assess, Induce, Summarize, Estimate and Examine.**

Kolawole (2013) believed that since conventional instructional method has not succeeded in improving learners’ performance as expected in the nation’s school, KPS method could be generally adopted as the method of instruction to be used for impartation of relevant knowledge in all the formally taught subjects. Also, KPS method on application in some selected schools yielded better results than the conventional method in vogue in Nigeria Schools (Kolawole, et. al, 2013).

Kolawole and Ojo (2016) conducted a study entitled “Statistical Analysis of the Effects of Kolawole’s Problem Solving (KPS) and Conventional Teaching Methods on the Academic performance and Retention of Senior Secondary School Students in Mathematics in Ekiti State, Nigeria” with a sample of 400 students. The result of study showed that all the sampled students were homogeneous at the commencement of the study. There were main, joint and individual significant teaching effects of the Kolawole’s Problem Solving (KPS) and conventional methods on academic performance, and retention of senior secondary school students in Mathematics.

Also, there was no significant difference in the academic performance and retention of students in rural and urban areas and also between male and female students. Based on the findings it could be concluded that KPS is more effective method and students retained more knowledge than conventional method. KPS method of instruction is neither location nor gender biased. The researcher considered Mathematics but this present study is interested in investigating the efficacy of KPS in Biology.

Ariyo (2017) conducted a study entitled “Effects of KPS and Lab-less Kits teaching strategies on the academic performance of secondary school students in Biology in Ekiti-State” with a sample of 209 students. The result of the study showed that KPS and Lab-less Kits teaching strategies 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 were no gender and location disparity in the student responses to KPS and Lab-less strategies of teaching Biology.

Daramola (2017) conducted a study entitled “Effects of Competitive, Cooperative and Kolawole’s Problem Solving (KPS) teaching strategy on academic performance in Mathematics among secondary school students in Ondo State”. The result of the study showed that KPS was the best method of teaching Mathematics out of the three methods considered in the study. Also the other two strategies namely competitive and cooperative were location biased while KPS was not location biased in the teaching of Mathematics.

Ojo (2018) conducted a study entitled “Effects of Two Problem Solving Methods on Senior Secondary School Students Learning Outcomes in Simultaneous Equations in Ekiti State, Nigeria” with a sample of 302 students. The result of study showed that KPS is most effective for enhancing better students’ performance in simultaneous equations, followed by

Polya method and lastly conventional method. As effective as KPS method was, KPS was not gender and location biased.

Olofin (2019) conducted a study entitled “Effects of Kolawole’s Problem Solving Strategy and Teachers’ Characteristics on Academic performance of Secondary School Students in Mathematics in Nigeria” with a sample of 562 students selected from three Geopolitical zones in Nigeria. The result of study showed that the use of KPS enhanced better performance of students in Mathematics than the conventional strategy. Teachers’ characteristics such as their qualification, teaching experience and gender did not influenced students’ performance in Mathematics when exposed to KPS and conventional strategies. KPS strategy is not gender biased and potent in all locations. Though there was difference in students’ performance in Mathematics when exposed to KPS based on their geo-political areas as students from South East geo-political performed significantly better than their counterparts in the South West and North Central.

Methodology

This study adopted a pre-test, post-test, control group quasi experimental design in which two groups (experimental and control groups) were involved. The homogeneity of the groups were established by pre-test while post-test was used after the treatment to measure academic performance. The pattern of the design is as shown below.

E: $O_1 X_1 O_2$: Experimental group

C: $O_3 X_c O_4$: Control group

Where

O_1, O_3 = Scores before treatment

O_2, O_4 = Scores after treatment

X_1 – Treatment by Kolawole’s Problem Solving strategy

X_c – Treatment by Conventional Strategy

The population of the study comprised all S.S.S. 2 students offering Biology in all the public secondary schools in Ondo State, Nigeria. The sample consisted of class intact size (students offering Biology) drawn from 4 public secondary schools in Ondo State. The sample was selected using multistage sampling procedure.

Stage One: One senatorial district was selected from the three senatorial districts in Ondo State through simple random sampling technique.

Stage Two: Two local government areas were selected from the senatorial district earlier selected using simple random sampling technique.

Stage Three: Two mixed public secondary schools were selected from each of the two selected local government areas through stratified random sampling technique

Stage Four: The S.S.S. 2 class of each of the four schools was purposively selected using purposive sampling technique.

Stage Five: In schools with more than an arm of S.S.S. 2 class offering Biology, a class intact size was selected using purposive sampling technique.

Achievement Test in Biology (ATB) was used for collecting the data for the study. ATB was used to measure performance of the students in Biology. It consists of Sections A and B. Section A sought for the bio-data of the respondents which include the name of the school, identification number and gender. Section B of ATB consists of 40 objectives items with four options made of 10 questions on Knowledge, 10 questions on Comprehension, 6 questions on Application, 6 questions on Analysis, 5 questions on Synthesis and 3 questions on Evaluation. The items covered all the topics to be taught for the 5 weeks. The ATB was used for both pre-test and post-test for data collection. The pre-test was designed to test the homogeneity of the

two groups. The contents of ATB used for pre-test was reshuffled for the post-test in order to prevent carry-over effects. The same achievement test was used for both experimental and control groups.

Initially, 70 test items were prepared on the selected concepts. The test was given to experts in test and measurement, and amendments were made according to their suggestions. From the assessment, only 40 test items survived scrutiny and were therefore adopted. A pilot test was carried out on the instrument by administering it on 30 SS2 students in one of the schools outside the sample area. The data collected were analysed using Cronbach Alpha which yielded reliability co-efficient value of 0.84 ($r=0.84$). This reliability coefficient was high enough to affirm the instrument reliable and hence used for this study.

To carry out the research in the schools, the researcher obtained permission from the authorities of the four schools. The study was carried out in three phases:

Phase I: Pre-treatment Stage

The researcher administered the pre-test instrument in the first week to both experimental and control groups in order to ascertain the homogeneity of the two groups.

Phase II: Treatment Stage

- a) **Experimental Group (KPS):** The package consisted of lesson plan on KPS strategy. Students were exposed to teaching, learning and evaluation for five consecutive weeks.
- b) **Control Group:** Control group has no special treatment. They were taught via conventional method (normal classroom interaction) for five weeks.

Phase III: Post-treatment Stage

At the end of the treatment stage, ATB was re-administered on the students to determine the effects of the treatment on them. The objective options of the same ATB used during the pre-test was re-arranged to avoid test-wiseness and administered to the experimental and control groups

The data collected through the instruments were analysed using descriptive and inferential statistics. The research questions were answered using means, standard deviation and bar chart. Hypotheses were tested using t-test at 0.05 level of significance.

Results

Research Question 1: What is the student's performance in Biology before and after exposure to Kolawole's Problem Solving (KPS) strategy?

Table 1: Mean and standard deviation of pre-test and post-test scores of students exposed to KPS and control methods

Strategies	Test	N	Mean	S.D	Mean Diff.
KPS	Pre Test	62	12.55	0.94	19.35
	Post Test		31.90	1.92	
Control	Pre Test	77	12.22	0.90	11.65
	Post Test		23.87	1.66	
Total		139			

From Table 1, it is shown that the mean difference in students' performance in Biology between pre-test and post-test scores for KPS method is 19.35 and control method is 11.65. It appears that the use of Kolawole's Problem Solving (KPS) strategy and conventional method influences students' performance in Biology with Kolawole's Problem Solving (KPS) strategy being the more effective method in the teaching of Biology. The graphical representation below further shows the more effective method in the teaching of Biology.

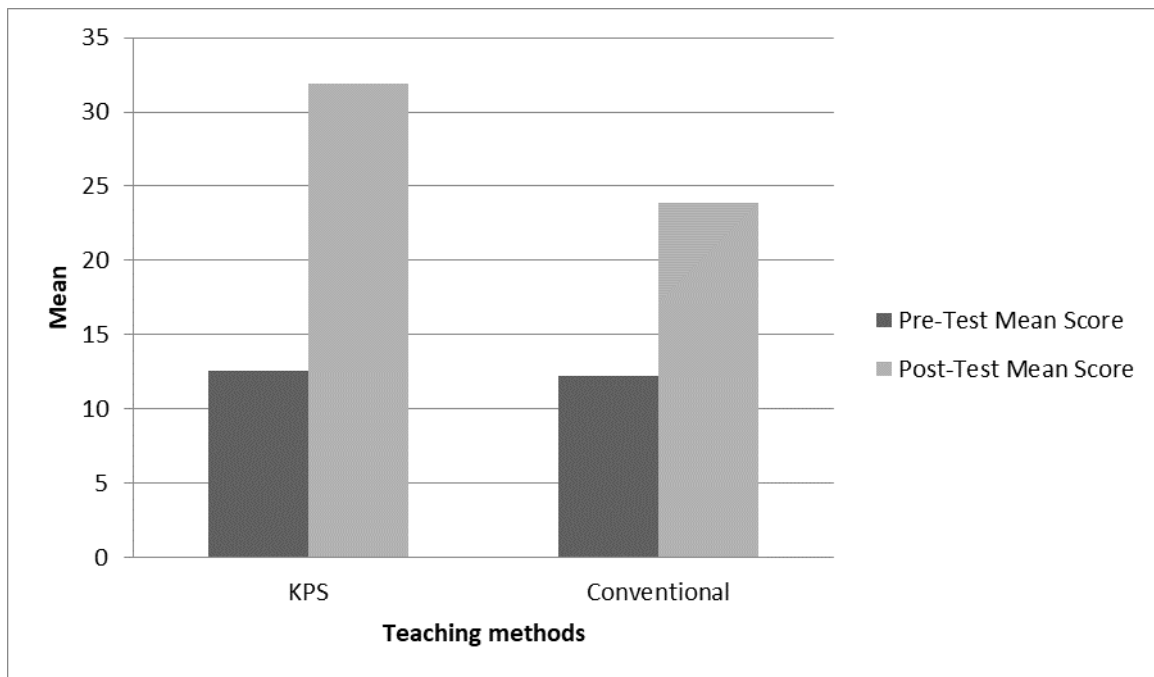


Figure i: Pre-test and Post-test mean scores of students exposed to KPS strategy and conventional method

Research Question 2: Will there be any difference in the performances of rural and urban students in Biology after treatments with Kolawole’s Problem Solving (KPS) and the Control Group (COG)?

Table 2: Mean and standard deviation of performances of rural and urban students exposed to KPS strategy and control method

Strategies	Location	N	Mean	S.D	Mean Diff.
KPS	Urban	33	31.51	1.99	0.83
	Rural	29	32.34	1.78	
Conventional	Urban	47	24.36	1.48	1.26
	Rural	30	23.10	1.65	
Total		139			

From Table 2, it is shown that the difference in performance of rural and urban students in Biology for KPS method is 0.83 in favour of rural students and conventional method is 1.26 in favour of urban students. The graphical representation below further shows the difference in performance of rural and urban students.

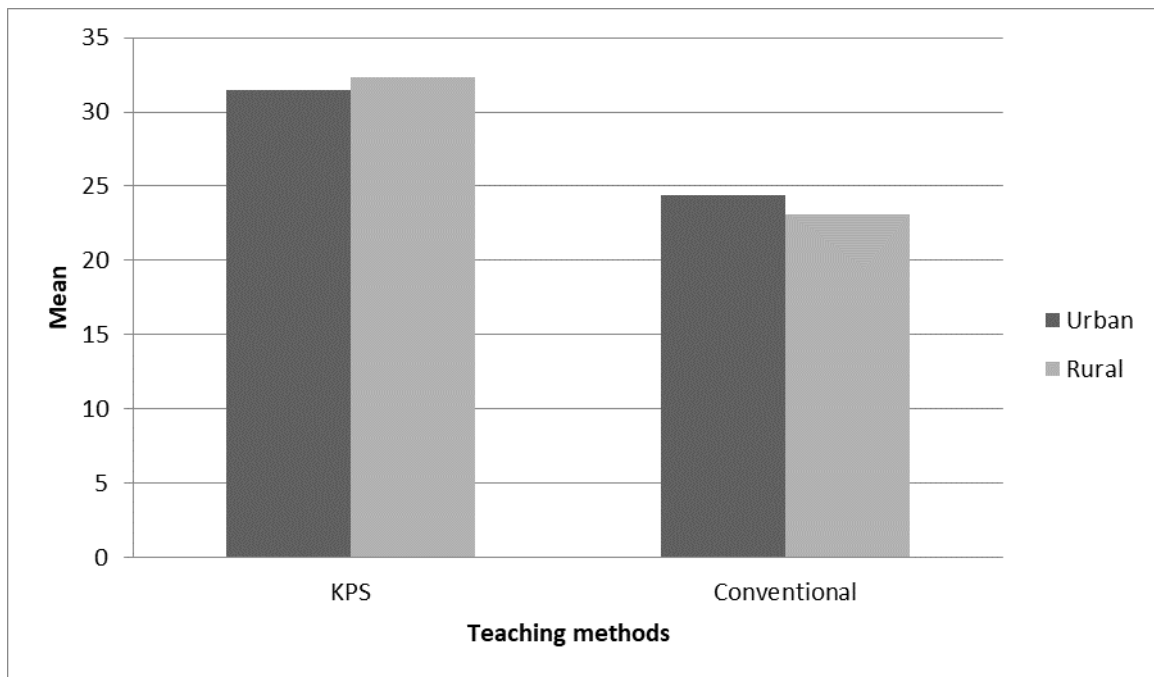


Figure ii: Difference in performance of rural and urban students exposed to KPS and conventional methods

Testing of Hypotheses

Hypothesis 1: There is no significant difference between the performance of students in Biology exposed to Kolawole’s Problem Solving (KPS) strategy and the Control Group (COG).

Table 3: t-test analysis for difference between the performance of students in Biology exposed to KPS and COG

Variations	N	Mean	SD	df	t _{cal}	P
Kolawole’s Problem Solving (KPS)	62	31.90	1.92	137	26.019*	0.000
Control Group	77	23.87	1.66			

*P<0.05

Table 3 shows that the t-cal value of 26.019 is significant at 0.05 level of significance because the p-value (0.000)<0.05. This implies that null hypothesis is rejected. Hence, there is significant difference between the performance of students in Biology exposed to Kolawole’s Problem Solving (KPS) strategy and the Control Group (COG) in favour of students exposed to Kolawole’s Problem Solving (KPS) strategy.

Hypothesis 2: There is no significant difference between the pre-test and post-test mean score of students exposed to Kolawole’s Problem Solving (KPS) strategy.

Table 5: t-test analysis for difference in the pre-test and post-test mean score of students exposed to Kolawole’s Problem Solving (KPS) strategy

Variations	N	Mean	SD	Df	t _{cal}	P
Pre-test	62	12.55	0.94	122	71.289*	0.000
Post-test	62	31.90	1.92			

*P<0.05

Table 5 shows that the t-cal value of 71.289 is significant because the P value (0.000) < 0.05. This implies that null hypothesis is rejected. Hence, there is significant difference



between the pre-test and post-test mean score of students exposed to Kolawole's Problem Solving (KPS) strategy. The mean score showed a significant difference of 19.35.

Hypothesis 3: There is no significant difference in the academic performance of students exposed to Kolawole's Problem Solving (KPS) and the Control Group (COG) based on location

Table 6: t-test analysis for difference in academic performance of students exposed to Kolawole's Problem Solving (KPS) based on location

Variations	N	Mean	SD	Df	t _{cal}	P
Urban	33	31.52	1.99	60	1.723	0.090
Rural	29	32.34	1.78			

P>0.05

Table 6 shows that the t-cal value of 1.723 is not significant because the P value (0.090) > 0.05. This implies that null hypothesis is not rejected. Hence, there is no significant difference in academic performance of students exposed to Kolawole's Problem Solving (KPS) based on location.

Table 7: t-test analysis for difference in academic performance of students exposed to control group based on location

Variations	N	Mean	SD	Df	t _{cal}	P
Urban	47	24.36	1.48	75	3.489*	0.001
Rural	30	23.10	1.65			

*P<0.05

Table 7 shows that the t-cal value of 3.489 is significant because the P value (0.001) < 0.05. This implies that null hypothesis is rejected. Hence, there is significant difference in academic performance of students exposed to conventional strategy based on location. The mean score showed a significant difference of 1.26 in favour of students in urban area.

Discussion

The findings of the study revealed that there was significant difference between the performance of students in Biology exposed to Kolawole's Problem Solving (KPS) strategy and the Control Group (COG) in favour of students exposed to Kolawole's Problem Solving (KPS) strategy. The study is in line with the assertion of Kolawole and Ojo (2016), Olofin and Falebita (2020) and Olofin and Kolawole (2020) who were of the opinion that the use of conventional method to teach students in school diminishes their performance.

The study further revealed that there was significant difference between the pre-test and post-test mean score of students exposed to Kolawole's Problem Solving (KPS) strategy. There was a better improvement in the performance of students resulting from their exposure to KPS. This implies that the introduction of KPS to the experimental group made them to perform better than the control group that was not exposed to treatment. The findings of Kolawole and Ojo (2016), Olofin and Falebita (2020) and Olofin and Kolawole (2020) show that KPS strategy application yielded better results than the conventional method. Olofin (2019) concluded that good teaching strategies have the potent to improve cognition of students. This also justifies the earlier postulate of this study that KPS could facilitate meaningful learning of Biology.

The result further revealed that there was no significant difference in academic performance mean scores of students exposed to Kolawole's Problem Solving (KPS) based on location. By implication, KPS strategy is not location biased because location of the student has no influence on the academic performance of the students who were taught Biology through KPS strategy. This result supports the findings of Ariyo (2017) who concluded that

school location is not a significant factor in students' performance in and attitude towards Biology.

Conclusion

Based on the findings of this study, it could be concluded that the use of Kolawole's Problem Solving (KPS) strategy positively enhance students' academic performance in Biology than the conventional strategy. The study further concluded that Kolawole's Problem Solving (KPS) strategy is not location biased.

Recommendations

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

1. The use of Kolawole's Problem-Solving (KPS) strategies should be encouraged in Biology class in secondary schools so as to positively enhance students' academic performance in Biology.
2. Authors of Biology textbooks should adopt Kolawole's Problem-Solving (KPS) strategy five steps in developing all chapters of their book.
3. Due to the stages involved in Kolawole's Problem-Solving (KPS) strategy, teachers should manage the time allocated well in order to accommodate the use of KPS strategy in teaching Biology.

References

- Ariyo, B.O. (2017). Effects of KPS and Lab-less Kits teaching strategies on the academic performance of secondary school students in Biology in Ekiti-State, Unpublished M.Ed Thesis, Department of Science Education, Ekiti State University, Ado-Ekiti.
- Daramola, K.R. (2017). Effects of Competitive, Cooperative and Kolawole's Problem Solving (KPS) teaching strategy on academic performance in Mathematics among secondary school students in Ondo State. Unpublished M.Ed Thesis, Department of Science Education, Ekiti State University
- Elechi, U.C (2010). Restoring the glory of the Teaching profession. A seminar paper at Ibeka High school, Umuahia to principals of senior secondary schools. *SEMBSCOPE Magazine*. 5, 9-11
- Ezemoka, G. (2011). Characteristics of effective Biology teaching in N. Salkind (Ed). *Encyclopedia of Educational Psychology, Thousand Oaks, LA: Sage Publications*.
- Federal Republic of Nigeria (FRN) (2014). National Policy on Education.
- Federal Ministry of Education (2013). *The National policy on Education*, Lagos. NERDC.
- Kolawole, E. B. (2013). Kolawole's Problem Solving Method (KPS): A Panacea to Mathematical and Life's Problems. *Standard Journal of Education and Essay*, 1(8), 131 - 141. <http://www.standresjournal.org/journals>
- Kolawole, E. B. and Ojo, O. (2016). Statistical Analysis of the Effects of Kolawole's Problem Solving (KPS) and Conventional Teaching Methods on the Academic performance and Retention of Secondary School Students in Mathematics in Ekiti State, Nigeria. *Research Journal of Education*, 2(6), 100-109.

- Kolawole, E. B., Oladosu, C. T. and Ajetunmobi, O. (2013). Comparability of Effectiveness of Problem Solving Methods on Learners Performance in Mathematics. *Unique Journal of Educational Research*, 1(2), 012 – 019.
- Kolawole, E. B. and Olofin, S. O. (2017a). Content Analysis of Kolawole's Problem Solving (KPS) Method: Key to Sustainable Change in Mathematics Teaching and Research Development. *ABACUS, Journal of Mathematical Association of Nigeria*, 42(1), 360 - 376.
- Kolawole, E. B. and Olofin, S. O. (2017b). Content Analysis of Kolawole's Problem Solving (KPS) Method. Book of Reading of Prof. M.F. Alonge, *Journal of Tests and Measurement*, 47 – 84
- Lawal, F. K. (2011). Biology Teachers' Perception of the Senior Secondary School Biology Curriculum and the Need for Reform. *Science Teachers' Association of Nigeria (STAN) 52nd Annual Conference 2011*.
- Ojo, O. F. (2018). Effects of Two Problem Solving Methods on Senior Secondary School Students Learning Outcomes in Simultaneous Equations in Ekiti State, Nigeria, Unpublished Ph.D Thesis, Department of Science Education, Ekiti State University
- Olofin, S. O. (2019). Effects of Kolawole's Problem-Solving strategy and teachers' characteristics on the academic performance of secondary school students in Mathematics in Nigeria. Unpublished Ph.D Thesis, Department of Science Education, Ekiti State University, Ado-Ekiti.
- Olofin, S.O. and Falebita, O.S. (2020). Kolawole's Problem-Solving (KPS) method as a Tool for Quality Teaching and Evaluation in Open and Distance Education. *Commonwealth Journal of Academic Research*, 1(3), 86 – 95. DOI: 10.5281/zenodo.3884304
- Olofin, S.O. and Kolawole, E.B. (2020). Effect of Kolawole's Problem-Solving Teaching Strategy on the Academic performance of Secondary School Students in Mathematics in Nigeria. *Advances in Social Sciences Research Journal*, 7(2) 68-77. DoI:10.14738/assrj.72.7749.
- Robert, E. S. (2011). *Educational Psychology theory and practice*. Pearson international edition Ninth Edition.

Cite this article:

Author(s), AKINWUMI, Ibukun Omolara, (2021). "Effect of Kolawole's Problem Solving On Academic Performance of Senior Secondary School Students in Biology in Ondo State, Nigeria". Name of the Journal: International Journal of Academic Research in Business, Arts and Science, (IJARBAS.COM), P, 62- 76, DOI: <http://doi.org/10.5281/zenodo.5813523> , Issue: 12, Vol.: 3, Article: 10, Month: December, Year: 2021. Retrieved from <https://www.ijarbas.com/all-issues/>

Published by



AND

ThoughtWares Consulting & Multi Services International (TWCMSI)

