

Effects of English and Yoruba interpreted biology picture label as an advanced organiser on students' learning outcomes in senior secondary schools in Ife East local government area

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Abstract

The study assessed the effect of English and Yoruba interpreted biology picture labels as an advance organiser on the achievement of senior secondary school biology students in Ile-Ife. It also investigated the effect of the labels on students' attitude toward biology. The study adopted the non-equivalent pre-test-post-test control group research design. The population for the study consisted of senior secondary school students in Ife-East Local Government Area of Osun state. The study sample comprised 128 senior secondary school II biology students in three intact classes selected using simple random sampling technique. The three classes were randomly assigned to two experimental and one control group, namely: Picture labels in English advance organiser group, picture labels interpreted into Yoruba advance organiser group and the conventional teaching method group. Two research instruments were used for the study, namely: Students' achievement test in biology and students' attitudinal questionnaire. Data were analysed using analysis of covariance. The results of the study revealed that there was a significant effect in the achievement of students in the experimental and control groups. There was also a significant effect in the attitude of students in experimental and control groups, with Yoruba interpreted picture labels having a better effect on the learning outcomes of biology students than picture labels in English and the conventional teaching method. The study concluded that picture labels interpreted into Yoruba as advance organiser was a better strategy in improving students' learning outcomes in biology.

Keywords: Achievement; advance organiser; attitude; picture; Yoruba language

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1. Introduction

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, identification and taxonomy (Okwo & Tartiyus, 2004). Biological knowledge plays a fundamental role in most aspects of human life. Its application in genetic engineering has resulted in the production of high yielding plant and animal species. This has made a tremendous contribution toward meeting the demand for food requirements for the ever-growing human population. Biology has also helped doctors learn how to keep people healthy and fight diseases. With the knowledge of biology, scientists understand how nutrition and exercise benefits health, ensure longevity and maximise physical performance. Considering its characteristics and importance, biology is one of the core subjects at secondary school certificate examination (SSCE) (Akindele, 2009). There is no doubt that the level of importance of biology will continue to exist. However, while the students recognise the importance of this subject, they lack the interest and the right attitude to learn it (Adetunji, 2012). This is evidenced by their discouraging performance in biology in public examinations as can be seen from the West Africa examination council in biology from 2004 to 2014. This poor performance in biology is one of the major reasons for decline in enrolment and performance in science and technology courses. Adesina (2003) supported by Adetunji (2012) stated that this poor performance may be due to several reasons including lack of effective methods adopted by the teachers and the attitude of students toward the teaching and learning of biology.

Table 1. Performance of students in biology in West African examination council May/June 2004–2014

Year	No. of enrolment	No. of candidates released	No. of passes and percentage at credit (A ₁ –C ₆)	No. of ordinary passes and failures (D ₇ –F ₉)
2004	1,044,091	1,021,831	503967 49.32%	517864 45.59%
2005	1,084,920	1,063,391	483949 45.51%	579442 54.49%
2006	1,172,949	1,147,757	682112 59.43%	465645 40.57%
2007	1,267,568	1,243,451	415934 33.45%	827517 66.55%
2008	1,360,615	1,332,737	555352 41.67%	777385 58.33%
2009	1,364,655	1,340,206	591299 44.12%	748907 55.88%
2010	1,325,408	1,300,418	729404 56.09%	948648 43.19%
2011	1,419,773	1,400,390	694033 49.56%	706357 50.44%
2012	1,460,121	1443545	577129 39.98%	866416 60.02%
2013	1,498,604	1,487,080	723762 48.67%	763318 51.33%
2014	1,511,327	1,501,263	552615 36.81%	948648 63.19%

Source: Records and statistics unit, West African examination council office, Lagos

Results in Table 1 showed the pattern of students' achievement in senior SSCE in biology conducted by WAEC for a period of 10 consecutive years (2004–2014). It could be seen from the table that the students' achievements in 2004, 2005, 2007, 2008, 2009, 2011, 2012, 2013 and 2014 were below average (50%). It was observed that only in 2006 and 2010 students' achievement was slightly above average 59.43% and 56.09%, respectively. This has strong implications for the study of science subjects at higher institutions of learning.

This situation calls for concern because the implication is that the students cannot retain relevant knowledge in the subject area necessary for successful academic performance. Hence, many instructional techniques are employed to teach in the school system today. Some of these are lecture, discussion, demonstration and field trip method. Since poor results are still consistent, then new method of approach to learning should be used in passing information to learners. This then gives rise to the question: How can biology be taught in a meaningful way such that students will acquire essential knowledge for optimum use? The question calls for among other things a study designed to investigate how the existing situation in biology education can be improved on, that is, how poor results obtained over the years can be reversed.

Advance organiser learning strategy as advocated by Ausubel (1962) has been used to foster the potential for teaching and learning in some aspects of biology which relate prior knowledge of learners to the new information the teachers intend to teach. It can be an appropriate instructional approach to the teaching of concepts in biology. However, advance organiser is an efficient strategy designed to promote efficient and meaningful learning and has been found to rely on connecting prior knowledge to new concepts. Ausubel (1960) expressed that it is a pedagogic strategy for implementing the principle of progressive differentiation and integrative reconciliation which involves the use of appropriately relevant and inclusive organisers that are maximally stable and indiscriminable from related conceptual systems in the learner's cognitive structure. It is used to provide the conceptual framework that the students can use to clarify the task ahead. Oloyede and Bamidele (2009) canvassed that advance organiser serves to provide anchorage in cognitive structure for new knowledge. If relevant concepts were not available, the advance organisers would serve to anchor new learning and lead to development of a subsuming concept, which can function to facilitate subsequent relevant learning. If appropriate concepts were already available in cognitive structure, advance organisers could serve as a link to new learning with specific, relevant subsumers. In the later instance, advance organisers would serve as a cognitive bridge, which would allow ready linkage between existing relevant subsumers and new material to be learned.

Visual cognitive organiser (picture) is a form of advance organiser. Picture is a visual representation of something, such as a person, object or scene, produced on a surface, as in a photograph and painting. The use of pictures brings about motivation toward the learning of biology. Ajibade (2008) opines that when pictorial materials (visual materials) are used for instructional purposes in conjunction with the teachers textbook and the chalkboard, they become 'carrier of knowledge.'

Picture labels interpreted into students' indigenous language or mother tongue (Yoruba) can also be used, advance organiser. Mother tongue is the child's first language, the language learned in the home from the parents and older family members. It is the language that the mother speaks to him at home. In Nigeria, English language is the medium of instruction from primary to tertiary level. This medium of instruction is different from the language of the immediate environment or mother tongue of the child; therefore, English is a second language. It is generally accepted that in teaching and learning processes, the mother tongue of the child is of utmost importance. It categorises a large part of the child's environment, that is, it has names for most of the objects, actions, ideas and attributes that are so important to him, as well as to any society.

It is, therefore, argued that learning science in the mother tongue will produce more lasting results than learning in a second language alone (Kosonen, 2005).

1.1. Purpose of the study

The main reason for the study is to assess the effect of English and Yoruba interpreted biology picture labels as advance organisers on students' learning outcomes in secondary schools.

The specific objectives of this study are as follows:

- a. Assess the effect of English and Yoruba interpreted biology picture labels as an advance organiser on the achievement of senior secondary school students in biology

- b. Investigate the effect of such picture labels on students' attitude toward biology.

1.2. Research hypotheses

1. There is no significant effect of English and Yoruba interpreted Biology picture labels as advance organisers on the achievement of senior secondary school students' in biology in Ife East Local government Area
2. There is no significant effect of English and Yoruba interpreted biology picture labels as advance organisers on the attitude of students' toward biology.

2. Methodology

The study adopted the non-equivalent pre-test-post-test control group research design. There were two experimental groups and one control group. The three groups were randomly assigned to treatments as follows: Group 1 was for picture labels in English alone advance organiser group, Group 2 was for interpreted picture labels in Yoruba advance organiser group and Group 3 for conventional teaching method group without an advance organiser. The population for the study consisted of senior secondary school students in Ife East Local Government Area of Osun state. The sample consisted of 128 senior secondary school II biology students in three intact classes. Three secondary schools were selected in Ife East Local Government Area using simple random sampling technique. One class was randomly selected from each of the secondary schools making a total of three classes for the study.

Two research instruments were used for the study. They are

1. Students' achievement test in biology (SATB): This instrument consisted of 25-item multiple choice objective questions on the digestive system, respiratory system and skeletal system that were selected from senior school certificate examinations question series organised by West African Examination Council and National Examination Council. It was used as pre-test and post-test
2. Students' attitudinal questionnaire (SAQ): The SAQ was used to collect data on individual students' attitude to the learning of biology. It was made up of 20 items designed to elicit the students' attitude toward biology. It was also used before and after the treatment.

In the 1st week, pre-test of SATB and SAQ was administered to the students in each of the schools. In the 2nd week, the researcher introduced the treatments to the students in each of the treatment groups. One class was taught using picture labels in English; the second class was taught using picture labels interpreted into Yoruba. The third class was taught using the teacher's expository method. All the treatments were used as advance organisers. The topics were taught again across each group with their pictures as in a regular lesson after the introduction of the advance organiser. The students were taught three topics (digestive system, respiratory system and skeletal system), one topic for 2 weeks making a total of 6 weeks for teaching. At the end of the 6th week, the three groups were post-tested using the same set of 25-item multiple choice objective questions in biology and the SAQ used as pre-test to the students to measure their achievement in biology.

Data were analysed using one-way analysis of covariance (ANCOVA) and Scheffe *post-hoc* test.

3. Results

Hypothesis one: There is no significant effect of English and Yoruba interpreted biology picture labels as advance organisers on the achievement of senior secondary school students in biology in Ife East Local Government Area. To test the hypothesis, the pre-test and post-test scores of the respondents were collected and then subjected to ANCOVA. The pre-test score acts as a covariate. The results of the analysis are presented in Table 2.

Table 2. Descriptive analysis of mean scores and standard deviation of students' achievement in biology

Treatment group	Mean	Standard deviation	n
Picture labels interpreted to Yoruba advance organiser group	71.3784	6.59693	37
Picture labels in English advance organiser group	65.2500	4.96155	48
Conventional teaching method group	63.5814	5.56448	43
Total	66.4609	6.48791	128

p<0.05

From Table 2, it could be seen that the conventional teaching method group had a mean of 63.58, the picture labels in English advance organiser group had a mean of 65.25 and picture labels interpreted to Yoruba advance organiser group had a mean score of 71.37. This shows that the picture labels interpreted to Yoruba advance organiser group performed significantly better than the other two groups.

Table 3. Analysis of covariance of the post-test scores of the three groups with the pre-test as a covariate

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	1322.528a	3	440.843	13.587	0.000
Intercept	34090.834	1	34090.834	1050.702	0.000
Treatments	1319.998	2	659.999	20.342	0.000
Pre-test	0.891	1	0.891	0.027	0.869
Error	4023.277	124	32.446		
Total	570729.000	128			
Corrected total	5345.805	127			

p<0.05

From Table 3, the results showed that there was a significant difference in the performance of the three groups: Picture labels interpreted into Yoruba as advance organiser group, picture label in English advance organiser group and the conventional teaching method group with $F = 20.342$, $p < 0.05$. Therefore, hypothesis one was rejected. To detect where the significant difference occurred, Scheffe *post hoc* test for multiple comparisons of means was carried out. The result is presented in Table 4.

Table 4. Scheffe *post hoc* test of the difference in means of the three groups

(I) Treatment group	(J) Treatment group	Mean difference (I-J)	Standard error	Sig.	95% confidence interval	Lower bound	Upper bound
Picture labels interpreted to Yoruba advance organiser group	Picture labels in English advance organiser group	6.1284*	1.24128	0.000	3.0533	9.2035	
	Conventional teaching method group	7.7970*	1.27231	0.000	4.6450	10.9490	

Picture labels in English advance organiser group	Picture labels interpreted to Yoruba advance organiser group	-6.1284*	1.24128	0.000	-9.2035	-3.0533
Conventional teaching method group	Picture labels interpreted to Yoruba advance organiser group	1.6686	1.19138	0.378	-1.2829	4.6201
Picture labels in English advance organiser group	Picture labels interpreted to Yoruba advance organiser group	-7.7970*	1.27231	0.000	-10.9490	-4.6450
	Picture labels in English advance organiser group	-1.6686	1.19138	0.378	-4.6201	1.2829

The Scheffe *post hoc* analysis in Table 4 shows that there was a significant effect in the performance of students taught with picture labels interpreted into Yoruba used as an advance organiser and those taught with picture labels in English used as advance organiser as well as the conventional teaching method ($p = 0.000$). However, there was no significant effect in the performance of those exposed to picture labels in English used as advance organiser and conventional teaching method ($p = 0.378$). This shows that picture labels in English advance organiser group and the conventional teaching method group had similar performance while picture labels interpreted into Yoruba advance organiser group performed significantly better.

Hypothesis 2: There is no significant effect of English and Yoruba interpreted Biology picture labels as advance organisers on the attitude of students toward biology. In testing this hypothesis, the data gotten from the SAQ in the pre-test and post-test were subjected to ANCOVA. The results are presented in Table 5.

Table 5. Descriptive analysis of attitude of students in the study area

Group	Mean	Standard deviation	n
Conventional	50.0000	0.00000	37
Picture labels in English advance organiser group	51.9512	4.01218	41
Picture labels interpreted into Yoruba	57.9000	1.94044	50
Total	53.7109	4.29457	128

$p < 0.05$

From Table 5, it could be seen that the conventional teaching method group had a mean of 50.00, the picture labels in English advance organiser group had a mean of 51.95 and the picture labels interpreted to Yoruba advance organiser group had a mean score of 57.90.

Table 6. Analysis of covariance on the attitude of the three treatment groups to biology

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	1517.842a	3	505.947	76.095	0.000
Intercept	22119.937	1	22119.937	3326.859	0.000
Pre attitude	3.940	1	3.940	0.593	0.443
Treatment	1511.493	2	755.747	113.665	0.000

Error	824.463	124	6.649
Total	371605.000	128	
Corrected total	2342.305	127	

This shows that the picture labels interpreted to Yoruba advance organiser group performed significantly better than the other two groups $p < 0.05$

Table 6 shows $F = 113.66$ and $p < 0.05$. This shows that there was significant effect in the attitude of students in the three groups i.e., picture labels interpreted into Yoruba advance organiser group, picture labels in English advance organiser group as well as the conventional teaching method group. We, therefore, reject the null hypothesis which says there is no significant effect of English and Yoruba interpreted biology picture labels as advance organisers on the attitude of students toward biology. To locate where the significant effect occurred, the Scheffe *post hoc* test for multiple comparisons of means was carried out. The result is presented in Table 7

Table 7. Scheffe *post hoc* test of the difference in means of the three groups

(I) Grp	(J) Grp	Mean difference (I-J)	Standard error	Sig.	95% interval Lower bound Upper bound	Confidence bound bound
Conventional method group	Picture labels in English advance organiser group	-1.9512*	0.58374	0.005	-3.3974	-0.5051
	Picture labels interpreted into Yoruba	-7.9000*	0.55826	0.000	-9.2830	-6.5170
Picture labels in English advance organiser group	Conventional	1.9512*	0.58374	0.005	0.5051	3.3974
	Picture labels interpreted into Yoruba	-5.9488*	0.54239	0.000	-7.2925	-4.6051
Picture labels interpreted into Yoruba	Conventional	7.9000*	0.55826	0.000	6.5170	9.2830
	Picture labels in English advance organiser group	5.9488*	0.54239	0.000	4.6051	7.2925

$p < 0.05$

The Scheffe *post hoc* analysis in Table 7 shows that there was a significant effect in the attitude of students taught with picture labels interpreted into Yoruba used as advance organiser and those taught with picture labels in English used as advance organiser as well as those taught with the conventional teaching method ($p = 0.000$). This table also shows that there is a significant effect in the attitude of students taught with picture labels in English advance organiser group and the conventional teaching method ($p = 0.005$) but picture labels interpreted into Yoruba advance organiser group performed significantly better.

4. Discussion of Findings

From the results and analysis, it was discovered that there was a significant effect in the achievement of students who were taught with picture labels interpreted into Yoruba used as an advance organiser. This probably may be due to the ability of the students to connect what they already know to the new concepts due to the Yoruba interpretation given to the English labels.

This result is in agreement with the studies conducted by Oloyede and Bamidele (2009) that teaching

students in science and mathematics by first explaining (advance organiser) the difficult concepts and terminologies in Yoruba makes the students to understand the concepts and terminologies better than when they were taught only in English language. However, this result does not agree with the result of Olanipekun, Atteh Andokari and Sarki (2014) which stated that there is no correlation between students' academic performance in English and Yoruba language and more importantly, students' academic performance in Yoruba language has no effect on students' academic performance in English language among secondary school students.

The findings of this study revealed that there was a significant effect of picture labels interpreted into Yoruba as an advance organiser on the attitude of students in biology than those taught with picture labels in English as advance organiser and the conventional teaching method. This is in conformity with the submission of Olarewaju (2003) that found out that indigenous language influences the thought process of a learner, the understanding of their environment and the learning of science. In contrast to the findings of this study, Ester and Chimhenga (2014) discovered that learners have a negative attitude toward the use of chiShona (Zimbabwe indigenous language) as a medium of instruction in the teaching of mathematics.

5. Conclusions and Recommendation

Based on the outcomes of this study, it was concluded that picture labels interpreted into Yoruba used as an advance organiser was a better strategy in improving students' learning outcomes in biology. It was also concluded that picture labels interpreted into Yoruba used as advance organiser enhanced students' attitude toward biology. It is, therefore, recommended that picture labels interpreted into Yoruba used as advance organiser should be used in the teaching and learning of biology. Teachers should be exposed to workshop/seminars on how to combine content knowledge, pedagogy and Yoruba language to effectively and efficiently teach biology to the students. The curriculum planner should introduce the advance organiser teaching strategy to the syllabus to improve students' learning outcomes.

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