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Original Research Article

Effect of Expository Organizers on Students' Performance in Biology among Secondary Schools in the Limbe Municipality, South West Region of Cameroon

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Abstract

This study focused on the effects of the use of expository organizers on students' performance in Biology in Selected Secondary Schools in the Limbe Municipality, South West Region of Cameroon. The quasi-experimental research design of non – randomized pretest, posttest was used. The population for the study consisted of 6,863 forms three students drawn from 102 secondary schools in Fako Division. Purposive sampling technique was used in selecting the different school types as well as the class. Using the simple random sampling technique, a sample of 150 students was drawn from the three schools that took part in the study. The instruments used for data collection were a questionnaire for students, the Biology Achievement Test (BAT), and an interview guide for teachers which were validated by research supervisors and other experts. Cronbach's Alpha Correlation Coefficient was used to determine the overall reliability analysis coefficient of the instruments and was projected to be 0.759 and 0.747 for experimental and control groups at pretest level, and 0.777 and 0.798 for experimental and control groups at posttest level. The data collected were analyzed using means, standard deviation and independent t-test to test the hypotheses at P≤ .05 level of significance while qualitative data was analyzed using thematic analysis. Statistically, the results showed that students in the experimental group taught using expository organizers (Mean 42.66 plus or minus 1.822) significantly (P-value 0.000< 0.05) performed far better than those in the control group that were not taught using expository organizers (Mean 6.58 plus or minus 0.347) and the t-calculated value was 19.452 > than the t-critical value of 1.960. All of the teachers in their own part said expository organizers are effective, increase students' comprehension (students' learning) for a short-term or long-term period, increase thinking capacity, increase performance, and increase class participations and engagement in lessons. Based on the findings, it was recommended that teachers should be encouraged to use expository organizer in teaching biology in secondary schools. It was also recommended that teachers in secondary schools should be trained on how to use advance organizers through workshops, seminars and symposia. School monitoring team and supervisors of educational programmes in secondary schools should ensure that advance organizers are used in teaching biology.

Keywords: Advance organizers, Biology Achievement Test (BAT), Control group, Expository organizers, Students' Performance

INTRODUCTION

For the past years, the importance of students excelling in school has been the common concern of parents, legislators, teachers, counselors, and psychologists. Parents and other care givers devote a lot of resources to their children's education because they believe that good academic achievement will produce a stable future for

them. Education involves learning which deals with acquiring knowledge which should be kept hold of. Retaining acquired knowledge by students and using it to carry out a task is what is most imperative about learning. Achievement and retention ability of students can be affected by the strategy used in teaching a particular subject. For this reason, a teacher must select effective teaching strategies that bring out the value and relevance of the lesson. Junior secondary school students' results in recent times has revealed that their performances are inconsistent and below expectations in science in general and biology in particular and results of a variety of studies have revealed that teaching strategies is one factor accountable for the inconsistent results and high rate of failure (Atomatofa, 2007).

The purpose of a good teaching strategy as emphasized by several researchers is to create memorable, transferable, and specified learning experiences that bring about standard performances not only on the basis of assessment but for behavior change even outside the class (Akeji, 2001; Kayode, 1997; Nneji, 1997; Umudhe, 1998; Yewande, 2000 in Atomatofa, 2007). For this reason, there have been struggles over the most suitable teaching strategies to apply to facilitate students' gain of understanding of certain scientific concepts, having in mind that instructional methods hampers motivation (Umudhe, 1998). A good number of students in the sciences view it as abstract and appear not to fully understand certain concepts in science particularly students in the lower levels of secondary school. There is need for the science teachers to introduce aids like organizers prior to the lesson to serve as anchor and help in improving students' learning.

As long as there have been educators, there has been an unquenchable thirst for superior and effective instructional techniques and practices. Educators have, throughout the ages, continued to incorporate new teaching strategies in their classrooms in an effort to facilitate and enhance the flow of information not only from the teacher to the students but also from the more capable students to the less capable ones. Hyerle (1996) stated that the focus of future teaching, learning, and assessment will not be in remembering only isolated 'things', but on how students interactively construct the pattern that connects. Sharing the same thought, Hudson, Lignugaris-Kraft, and Miller (1993) noted that positive outcomes for curricular enhancements require the use of effective teaching practices. Dewey (2011) further stated that "If we teach today as we taught yesterday, we rob our students of tomorrow". Therefore, to make learning more meaningful and transfer of knowledge easier, teachers need to use teaching strategies that involve the active participation of students. Therefore, a study on the effects of expository organizer on students' learning of biology is of great importance to the present educational reform.

Background to the Study

Scientific knowledge has become such an essential instrument that no nation, developed or developing, wishing to progress in the socio-economic sphere can afford to downgrade its learning in schools. In the midst of other roles of science education at the secondary school level is the capacity to allow the students get hold of scientific knowledge systematically that will be of use to them in their everyday life practice. According to UNESCO (1975) and Osborne (1997) as cited in Shihusa and Keraro (2009), school biology should be relevant to real life experiences of a learner. Scientific knowledge and skills equipped in the learners should ensure sustainability of societies (UNESCO, 2017).

The economic growth in any society depends on the scientific skills and knowledge gotten from learning of biological concepts. In Cameroon and other countries, courses such as medicine, agriculture, nursing, etc require a firm background in biology. Biology instills in the learners' conservation skills, interpersonal, problem-solving, scientific, and time management skills respectively. Recent issues such as Corona virus, environmental degradation, reproductive health, etc have been incorporated in biology due to the role it plays in humans. Report from the National Academy of Sciences (NAS, 2009) indicates that knowledge in biology can be used in finding solutions to certain important societal needs including restoration of the ecosystem, sustainability in food production, and overall improvement of health issues in humans. Therefore, for Cameroon's vision 2035's goals to be achieved; biologyhas to be considered a relevant subject.Teaching strategies that promotes deep lifelong learning have to be considered especially in this technology driven era.

There is need to change from closely directed learning of facts to conceptual understanding, application of acquired knowledge and skills to solve emerging problems. To achieve this, teaching strategies used should be one which stimulates students' previous learning and give them the opportunity to discover knowledge for themselves. Studies on teaching methods have long been in existence as quite a good number of such have been undertaken by different researchers. Continual research on teaching strategies indicates that, in the changing world of interest with a lot of challenges, it is difficult to have a teaching method that is sufficient for all propositions.

Students' attitude to learning, language difficulties, classroom environment, teachers' role, length of classroom session, teaching strategy, has been identified as some possible factors among others that are responsible for low students learning and achievement (Coskin, 2011; Webb, 2009). Though some of the factors may not be related to the teacher, but method of teaching continues to play a fundamental role in school learning. Nekang and Agwagah (2010) pointed out that degrading

interest and students' poor performance in Mathematics have been attributed to poor teaching technique in Cameroon secondary schools. The way teachers organize and present the content to be taught has the ability of making the learners to like or hate both the teacher and the subject, Ada (2016) reiterated. This therefore implies that the teacher should not only be concerned with general methodology but distinct strategies of teaching various subjects in order to stimulate learners' motivation and interest inlearning.

Nsamenang (2004) suggested an eclectic approach to teaching which is sometimes used because it is not so easy to say what the best method of teaching is. He recommended that to apply this approach, one need to specify the type of learner, the subject matter, the conditions under which teaching and learning take place, be aware of the envisaged outcomes of teaching and the administrative advantages and disadvantages of particular techniques in specific situations. The best teaching method according to Nsamenang (2004) would be that which can engage all the sensory modalities of the learners like the advance organizer teaching approach.

In line with this, Jitzi (2019) correctly said that the conventional teaching method of instruction can be used in teaching some biological concepts alongside other methods and therefore recommends that it should be used with others like the demonstration, illustration method for better understanding. Danmola and Femi-Adeoye (2004) also supports the opinion that no single method is considered the best in teaching science especially biology, but suggested student-activity-based approach to improve performance. The most commonly used teaching method in schools has been identified to be lecture method (Ugwuadu, 2010) which has been described as inappropriate and not stimulating enough. However, no matter how appealing lecture method appears to be it has been criticized for promoting passive rather than active learners. Its failure to meet up with the current challenges of creating learning environment that will support meaningful learning cannot be over emphasized.Jitzi (2019) stated that the innovation in the biology curriculum in Cameroon has shifted from New Pedagogic Approach to the Competency Based Approach (CBA) in teaching and does not foresee the place of the lecture or conventional method of teaching as a tool to bring out competency or the acquisition of scientific knowledge and skills in the learners of biology in secondary schools and stand a little chance of contributing to Cameroon's emergence by 2035.

In order to make students learning of biology more meaningful and improve performance, there is need to device new ways of disseminating instructional materials to students. There is a call for biology teachers to shift from standardized teacher-directed instruction to a more active learning environment where students can participate actively and make use of their creative minds rather than remain passive. Effective teaching and learning strategies, including use of advance organizers such as expository organizershave been widely perceived as probable solutions to the learning challenges students face. Thus, our teachers of Cameroonian secondary schools have to present lessons carefully and explicitly with the help of innovative teaching strategies, while actively engaging students in order for the students to develop positive attitudes towards learning thereby making retentioneasier.There is therefore a continuous struggle to enhance the quality of teaching and learning with the aim to improve students' learning andperformance through the use of ground-breaking teaching strategies. Advance organizer is therefore, described as an appropriate modern teaching strategy for teaching science concepts (Ausubel 1960).

Advance Organizers

Advance organizers are devices used to help students' easy understanding of new information by linking it to knowledge which already exist. Hudson (2009) iterated that the most relevant agents that can cause a change in students' motivation towards science is the teacher, through the use of stimulating and motivating instructional strategies like advance organizers. Prior to looking into a topic or lesson, it is advisable tohave students complete an advance organizer. They are used to accomplish several tasks including allowing teachers to assess students' prior knowledge, assisting learners' organize existing knowledge, making it possible for relevant information to be stored into the working memory, permitting students to connectnew information with existing information (known as priming), and providing students with aninstrument that can assist in reflection and metacognition.

There exist many strategies that can help improve students' performance in biology. One of such strategies is the advance organizer teaching strategy. It is a cognitive instructional strategy used to facilitate the learning and retention of new information (Ausubel, 1962). They are relevant information that is presented before actual learning and they can be used by learnersto organize and interpret new upcoming information (Mayer, 2003). One of the job of an advance organizer is to direct the learner to relevant previousknowledge and points onward to new material. Some basic purposes of advance organizers in promoting learning are: Firstly, they direct the learner to what is important in the lesson that is to come. Secondly, they draw the learner's attention torelationships among ideas. Lastly, they remind learners of relevant information they already have (Joyce and Weil, 2004). The implication is that advance organizers activate the learners' curiosity and enthusiasm to learn. This curiosity helps the students to stay focusedon the task in order to grab each and every detail,

and by this means, learners are able to connect the various ideas in the lesson to enhance understanding.

Consequently, advance organizers are used in arousing students' interest and improve performanceall through by relating knowledge that is new to previous knowledge that the learners have at the commencement of the lesson. This is in agreementwith Crowell (2013), who emphasizedthat advance organizers serve as a link between prior knowledge to new knowledge, helps students keep track of information and also reflect on the lesson. Hill and Fylnn (2013) asserted that advance organizers activate preceding knowledge and learners' curiosity andenthusiasm in the lesson and as such meaningful learning is likely to be acquired. When meaningful learning takes place, the learners will have acquired sufficient biological skills in several formats. Several types of advance organizers exist including narrative, textual organizers, graphic and expository organizers.

Expository advance organizers are examples of high-quality instructional tools which help build confidence, make knowledge meaningful and memorable, and help students make connections (Dean, 2012). All students can learn but that isn't likely unless there is high quality instruction that encourages higher order thinking in every classroom every day. High quality instruction involves knowing what strategies to use and how, when and why to use them. Advance organizers are examples of high quality instructional tools which help students develop confidence in their ability to learn challenging content and access and build on their prior knowledge. High quality instructional strategies also help students interact with knowledge on deep levels, store knowledge in memory in multiple ways, and use complex reasoning processes to make knowledge meaningful and memorable. When teachers use these strategies intentionally and with quality and fidelity to create the environment for learning to help students to develop understanding and extend and apply their knowledge, learning becomes more meaningful and transferable.

Expository Organizers are precise, factual ways of describing new content e.g.students can be asked to go to an article in Wikipedia to read about a new topic under study or they may read the first paragraph in their textbook to activate background (prior) knowledge and get acquainted with new vocabulary and concepts they are going to be learning and also connect what they are learning to what they already know. They provide new knowledge that students' will need to understand the upcoming information (Woolfolk, Winnie, Perry, &Shapka, 2010). Expository organizers are often used when the new learning material is unfamiliar to the learner. They often relate what the learner already knows with the new and unfamiliar material—this in turn is aimed to make the unfamiliar material more plausible to the learner.

The expository organizer gives students a big-picture of the lesson's purpose before the lesson begins (Osewalt, 2014). For example, a teacher may tell students what the lesson's goals are: "We've talked about what habitats are and why some animals prefer to live in different places than others animals do. Our goal today is to learn about the four layers of a tropical rainforest and which animals live in each of those different layers." A teacher may also ask students to skim over a reading, focusing on highlighted information such as captions or chapter headings. That makes them familiar with the material before they read it more thoroughly. Another example would be the concept of a right angle in a mathematics class. A teacher could ask students to point out examples of right angles that they can find in the classroom. By asking students to do this, it helps relates the students' present knowledge of familiar classroom objects with the unfamiliar concept of a 90 degree right angle. Summarily, EOs depicts new content, informs students specifically about the material they are going to learn or explains the general ideas in advance and reviews in advance definitions that students will come across during the lesson as below.

Expository Organizer on Amoeba

One-celled Wonders: False-Footed Sarcodines

Over half of the approximately 65,000 kinds of these animal-like organisms are known only from fossil record. They are single celled organisms that come in many different sizes, different survival strategies, and shapes ranging from those that can change their shape to those with fixed shapes and complex structures. They live in a wide variety of moist habitats including fresh water, marine environments, the soil, plants, animals, and even people were they live as parasites. Although unicellular, they have a nucleus and membrane-bound organelles, making them functionally complex despite their small size. Each of these small single-celled organisms is a self-supporting unit, carrying out all the processes for survival in just one cell. In this group of organisms, one cell can perform all the functions necessary for independent life. There are about 30,000 known species of these unicellular organisms, commonly classified according to their movement patterns as Sarcodines-moving with false feet called pseudopodia or, flagellates-moving with whip-like structures known as flagella, ciliates-moving with short hairs known as cilia, and sporozoans-with no movement. Despite their differences, they all have several characteristics in common. In addition to a nucleus to house their genetic material, most have mitochondria for metabolic functions, and vacuoles for digestion and excretion. With the help of these and other cellular structures, these organisms may feed, grow, respire, and reproduce.

A special group of these one-celled organisms are the Sarcodines which move by means of pseudopods or

false feet. They can be obtained by collecting slime from the bottom of a pond or from the leaves of aquatic plants. This single-celled, jelly-like organism continually pushes out pseudopods, giving itself an ever-changing, irregular body outline. Normally, this unicellular organism has several small pseudopods sticking out in different directions at the same time. When it sends out a longer pseudopod, the rest of the cytoplasm flows slowly in that direction. Although it has no eyespots, this unicellular organism still moves away from bright lights, toward food substances, and away from harmful chemicals. Exactly how this organism is able to distinguish between these things is unknown. It uses its pseudopods not only to move in specific directions but also to ingest food particles. At least one contractile vacuole regulates the organism's water content. Together with other parts, this organism is able to survive in its environment.

Performance is what can be measured and observed. Academic performance is the measurement of students' achievement across various academic subjects. Nnaobi (2007), describes achievement in the teaching - learning process as the attainment of set objectives of instruction by students. For example, if a learner accomplishes a task successfully in a particular science subject and attains the specific goal for a particular learning experience, such a student is said to have achieved or performed well (Igboegwu, 2012). Achievement is a product of one's knowledge and his ability to reproduce what has been taught in the learning process.One of the major parameters used in assessing and determining the progress of students in an academic program is through assessment in a given subject. The promotion and repetition of a student in a given academic program is envisaged on the basis of his understanding of the learning process interpreted to be his academic performance. Teachers could use students' performance as a platform to evaluate their pedagogical skills and methodology which is very necessary as it helps in evaluating several variables that might be responsible for students' performance. Poor performance of students in Biology in external examinations is linked to the use of traditional method in teaching secondary school biology, lack of enough teaching-learning resources, abstract nature of science, and unqualified teachers (Isiugi-Abanihe, Long John and Ibenne, 2010; Keraro, Okere, and Anditi, 2013).

The general desire to improve teaching performance and students' academic performance in biology and other science subjects happens to be a worry of all involved in education in Cameroon. Many educational planners have in the last years been complaining about the unstable trend of performance recorded for biology at the General Certificate of Education, Ordinary level (Cameroon GCE O/L) examinations. Performance of biology in June 2019 sessionlow where 30177 candidates registered; 29916 sat; 261 were absent; 17032 failed and only 12884 passed, thereby registering a percentage pass of 43.07% (Cameroon GCE Board, 2019)

The importance given to biology as one of the core subjects in science (Cameroon GCE Board, 2016) is an indication of the kind of quality training that should be given to its teachers. Such knowledge does not only include the teachers' mastery of the subject matter but also includes the teaching methods teachers use to disseminate that knowledge to the students. But, a cross-section of teachers in Cameroon secondary schools have hardly undergone professional or in-service training and as such, are not knowledgeable of the different innovative teaching techniques that can be used to make the teaching-learning process more meaningful and enjoyable so as to make retention and transfer of knowledge easier. Amidst the several factors affecting students' performance in biology, poor usage of teaching strategies have been seen to affect students' performance in biology more (Keraro, Okere, &Anditi, 2013). The current teaching strategies used do not assist learners in responding to questions which considers curriculum topics from various perspectives.

It is on this serious note that this researcher is troubled about this inappropriate teaching strategies used in Cameroon secondary schools despite the efforts made by the government and biology stakeholders to improve students' performance in biology. The problem that this researcher is interested in is to find out the effect of expository advance organizer teaching strategy on students' performance in biology in secondary schools in the Limbe Municipality.

METHODOLOGY

The Research Design

The mixed method embedded design was used for this study. The embedded design is a mixed method design in which one data set provides a supportive, secondary role in a study based primarily on the other data type (Creswell, Plano Clark et. al., 2003). This design is mostly of use when a qualitative component needs to be embedded within a quantitative design, as in the case of an experimental or correlational design. When used in an experimental study, the investigator includes qualitative data to follow up on the results of an experiment or to examine the process of an intervention. The embedded design procedure involves mixing the data sets with one type of data being embedded within a methodology framed by the other data type (Caracelli and Greene, 1997) as might be done in an experimental design where a qualitative data could be embedded within a quantitative methodology.

The most commonly used variant of the embedded design seems to be the embedded experimental model (Creswell, Fetters, & Plano Clark, 2005). The model is characterized by having qualitative data embedded within

an experimental design such as a true experiment or a quasi-experiment. The quasi-experimental research design of non-randomized pre-test, post-test type was used to measure the comparative effects of the use of advance organizer teaching method (independent variable) on form three students' performance in biology (dependent variable) in secondary schools within the Limbe Municipality.

Population and Target Population

The population for this study consisted of 6843 forms three students drawn from 102 secondary schools in Fako Division of the South West Region of Cameroon. Meanwhile, the target population was made up of 2,112 (Boys= 523 and Girls= 1589) form three biology students in the various (22 in number) secondary schools in the Limbe Municipality and biology teachers inclusive. The accessible population was made up of 450 forms three biology students drawn from three (3) secondary schools within the Limbe I Subdivision.

Sample and Sampling Techniques

The sample for this study consisted of 150 forms three biology students who were selected using the simple random sampling approach from three secondary schools within the Limbe I Subdivision with 75 students forming the experimental group and the other 75 forming the control groups. Purposive sampling technique was used in selecting the different school types (confessional, lay-private, and public schools) to ensure an equal distribution of the schools used for the study. However, the simple random sampling technique was used to choose the different schools to represent the types of schools purposively selected for data collection. The schools that were selected included the following: Government Bilingual High School Limbe (G.B.H.S), Presbyterian Girls Secondary School, Limbe (P.G.S.S), and National Comprehensive High School Limbe (N.C.H.S). Because of lack of confessional schools made up of both sexes in the Limbe I Subdivision, the researcher decided to include a single sex confessional school in the study and this may somehow affect the final results. Intact classes were used throughout the study in order not to disrupt the school class arrangement and time table. Sambo (2008) in Eche (2018) is of the opinion that it is rational to use existing classroom in school for a study than to start creating new ones through random selection and random sampling.

Purposive sampling was also used to select the class (form three) used for this study. Form three was purposively selected for the study because it is a transitional class in the Cameroonian school system were the Cameroon Certificate of Education (GCE) syllabus starts. Students in this class are in their peak period of puberty where they experience many changes and challenges. Students of this age group (12-18years) are faced with a lot of educational, biological, intellectual, emotional as well as social problems as such need a lot of care and assistance from their teachers and loved ones to help them adjust to life situations. There is need for innovative instructional strategies that will stimulate prior learning, make learning more meaningful and give room for transfer of learning. The researcher therefore, thought that the influence of advance organizers on students' learning of biology could easily be investigated in such a class as it is perceived to help in improving future learning and achievements. Furthermore, form three offers opportunity for continuity with the research where necessary as it is not a terminal class**.**

Fifty (50) students offering biology were then selected from G.B.H.S Limbe, 50 from P.G.S.S, and 50 from N.C.H.S Limbe respectively. Out of the 150 respondents, 46 were males and 104 females. The number of females sampled was more than that of males because in all the schools and classes that the researcher selected female students dominated all the classes, that is, the female population was more than that of the male. It was also due to the fact that a single sex school (P.G.S.S) was used. The disparity in the number of students selected in each school can be attributed to the fact that the population in these schools differed.

The sample was further divided into two groups: an experimental and a control group in each of the schools selected. Fifty (50) students were selected from G.B.H.S Limbe, 50 students' from P.G.S.S and 50 students from N.C.H.S; and divided into experimental and control groups respectively. A total of three (3) experimental and three (3) control groups were used. Both the experimental and control groups were subjected to the same pre-test and post-test before and after treatment. The experimental group was exposed to treatment (use of advance organizer) within a period of two (2) months. The control group was not exposed to any treatment and was taught using the conventional method. After the treatment period, both groups were administered the post-test.

Purposive sampling was used to get some of the teachers of the sampled students who were systematically included in the sample. Six (6) biology teachers from the three randomly selected schools were used. The teacher sample consisted of teachers who have taught biology in form three in the schools selected.

Research Instrument

The instruments used for data collection in this study were a questionnaire and a Biology Achievement Test (BAT) for students, an interview guide for teachers, and an observation guide for classroom instruction. The

Table 1. Students from the Experimental Group's Opinion on use of Expository Organizers

Items	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Std. Deviation
Ability to present biological concepts in different phases.	35 (46.7%)	36 (48.0%)	4 (5.3%)	0 (0.0%)	3.41	.595
Ability to relate to the main biological concept.	43 (57.3%)	30 (40.0%)	1 (1.3%)	1 (1.3%)	3.53	.600
I can identify unfamiliar words in main concept	32 (42.7%)	37 (49.3%)	4 (5.3%)	2 (2.7%)	3.32	.701
Ability to make use of learned concepts	43 (57.3%)	32 (42.7%)	0 (0.0%)	0 (0.0%)	3.57	.498
Ability to recall facts learned	36 (48.0%)	34 (45.3%)	2 (2.7%)	3 (4.0%)	3.37	.731
Aggregate	**189 (50.4%)**	**169 (45.1%)**	**11 (2.9%)**	**6 (1.6%)**	**3.44**	**0.625**

instruments used were designed by the researcher, scrutinized and approved by the research supervisor and co-supervisor. The BAT was used for pretesting to determine the extent of knowledge of the concepts to be taught before the study. The main objective of both the questionnaire and the interview guide was to measure how advance organizers affect students' performance in biology.

Method of Data Analysis

The data for this study was analyzed using both the descriptive and inferential statistics. These two statistical approaches were used because the study deals essentially with quantitative data. Qualitative data was analyzed using thematic analysis under umbrella terms. Before the data was analyzed, a data sheet was extracted on Excel and exported to SPSS version 25.0 (IBM Inc., 2017) for analysis. On the SPSS software, both descriptive and inferential statistics was used in analyzing the data.

RESULTS

Results from Questionnaire Data

Based on the students from the experimental group's opinion on use of expository organizers, cumulatively, the results indicated that a majority of them 94.7% (71) were of the opinion that they have the ability to present biological concepts in different phases. The findings also indicated that 97.3% (73) of the students indicated that they have the ability to relate to the main biological concepts. Also, 92.0% (69) of the students agreed that they could identify unfamiliar words in texts. Furthermore, all of the students 100% (75) agreed that they have the ability to make use of concepts learned. Finally, 93.3% (70) of the students indicated that they could recall main facts learned. In overall, a majority of the students 95.5% with a high mean of 3.44 on a scale of 1-4 indicated that expository organizers facilitates their learning and improves performance while 4.5% of them disagreed. Table 1

Result from Experiment Data

In comparing the students mean achievement score in the test at the pretest level where expository organizer was not used in the control and experimental groups to teach the concept of classification, the results showed that the overall mean achievement score for students in the experimental group was 7.06±0.440 while that in the control group was 7.53±0.270. The mean difference between the two groups of students was 0.47 which is less than 1. The non-significant p-value of 0.150 > 0.05 implied that students in both groups did not significantly perform better than each other when expository organizers was not used in teaching and this was observed in all three schools with students in the experimental group not significantly performing better than those in the control group (PGSS, experimental =6.74±0.729, control =6.84±0.448; NCHS, experimental =8.20±1.099, control =7.85±0.455; and GBHS Limbe, experimental =6.40±0.408, control =7.80±0.440). Table 2

Comparing the students mean achievement score in the test at the posttest level where expository organizer was used in the experimental group to teach classification and not in the control group, the results showed that the overall mean score for students in the experimental group was 42.66±1.822 with a standard deviation value of 14.576 which is far higher than that in the control group 6.58±0.347 with standard deviation of 2.776. The mean difference between the two groups of students was recorded as 36.08 which were very high. The significant p-value of 0.000 < 0.05 implied that

Table 2. Comparing Student Mean Score at Pretest Level where Expository Organizers was not used

Schools	Test level	Group	N	Mean	Median	Minimum	Maximum	Std. Error of Mean	Std. Deviation
PGSS	Pre-test	Experimental	25	6.74	5.00	0	15	.729	3.177
		Control	25	6.84	7.00	5	10	.448	1.951
NCHS	Pre-test	Experimental	25	8.20	9.50	0	20	1.099	4.916
		Control	25	7.85	8.00	2	10	.455	2.033
GBHS Limbe	Pre-test	Experimental	25	6.40	5.00	4	11	.408	2.041
		Control	25	7.80	8.00	5	11	.473	2.363
Total		Experimental	75	7.06	5.50	0	20	.440	3.518
		Control	75	7.53	8.00	2	11	.270	2.160

P-value =0.365, t-value=0.908, df=148, Mean difference=0.47

Table 3. Comparing Student Mean Score at Posttest Level where Expository Organizer was used

Schools	Test level	Group	N	Mean	Median	Minimum	Maximum	Std. Error of Mean	Std. Deviation
PGSS	Post test	Experimental	25	44.47	44.00	13	72	3.005	13.099
		Control	25	7.21	8.00	2	10	.481	2.097
NCHS	Post test	Experimental	25	41.15	43.50	12	69	3.479	15.557
		Control	25	5.70	5.00	3	12	.482	2.155
GBHS Limbe	Post test	Experimental	25	42.48	45.00	13	67	3.052	15.259
		Control	25	6.80	8.00	2	12	.700	3.500
Total		Experimental	75	42.66	44.00	12	72	1.822	14.576
		Control	75	6.58	6.00	2	12	.347	2.776

P-value =0.000, t-value=19.452, df=148, Mean difference=36.08

students in the two groups differ significantly in their achievement score and this was equally clear in all three schools with students in the experimental groups performing higher than those in the control groups (PGSS, experimental =44.47±3.005, control =7.21±0.481; NCHS, experimental =41.15±3.479, control =5.70±0.482; and GBHS Limbe, experimental =42.48±3.052, control =6.80±0.700). Table 3

Qualitative Results from Teachers on Expository Organizers Teachers' understanding of expository organizers

Based on the teachers understanding of expository organizers, all of them said expository organizers means explaining/summarizing main concepts in a lesson or giving a broad idea about a lesson to the students as indicated in some of their statements "*Explaining main concepts in an abstract manner", "Giving students an idea of what will be learned thereby increasing their understanding". "Giving students broad ideas before the lessonsbegins*".

Teachers' use of expository organizers in their lessons and how often it is used

Finding out from the teachers if they have been using expository organizers, the findings showed that they have been using it; with some teachers using daily while others do not use daily. The teachers further added that their intention of using expository organizers is to help students think critically and arouse their curiosity of the upcoming lessons, for prior knowledge of main lesson and for students to gather ideas for the lessons.

Table 4. Comparing Students Overall Mean Score in When Taught Using Expository Organizers

Group	N	Mean	Std. Deviation	Std. Error Mean	P-value	$T_{calculated\ value}$
Experimental (Taught using expository organizers	75	42.66	14.576	1.822	0.00	19.452
Control (Taught without the use of expository organizers)	75	6.58	2.776	.347		

At confidence interval (CL) 95%, df=148, $t_{critical\ value}$=1.960, Mean difference=36.08, P value 0.00< 0.05.

However, some of the teachers add that they use expository organizers but not often because it is difficult to construct.

When teachers use expository organizers

Furthermore, asking the teachers when they use expository organizers, many of them said they use it at the level of pre-instruction and during instruction for referral and understanding and proper exchange of materials among the students while only one of the teachers said he/she use it only in pre-instruction for students to know the entire lesson and where to focus on.

Teachers' opinion on whether they see an increase in students' comprehension when using expository organizers and if they areeffective

Also, asking the teachers if they see an increase in students' comprehension when using expository organizers, all of them said yes and the increase in comprehension was both long term and short term period as they said "*increase in long terms comprehension of materials*" "*I see long term increase in comprehension because the students are able to recall main concepts and perform well in test*". Also, some of the teachers added that students are more engaged in lessons when expository organizers are used and understands better as they stated "*there is more engagement when using this method and repeating the main concepts over and over helps students understand better*".

Furthermore, finding out from the teachers if expository organizers are effective, all the teachers indicated that expository organizers are effective and beneficial to the students in that it increases their thinking capacity, increase their performance and increase class participations and engagement as they narrated "*It increases performance and applicability of concepts"*, *"Stimulate learners thinking capacity and help them easily understand difficult concepts*", "*Massive participation from the students*", "*Students engage better*".

The challenges teachers encountered when using expository organizers and recommendations for a way forward

Finding out from the teachers the challenges they faced in the use of expository organizers, many of the teachers said the use of expository organizers is time consuming as they reported "*Construction of expository organizers is time consuming and demanding*". "*They take a lot of time and research to construct. At times, it is difficult to understand*". Also, another challenge is that didactic materials are lacking as they narrated "*Unavailability of teaching materials", "Not enough didactic materials*". Some of the teachers add that some of their colleagues are resistant to change as they prefer using traditional teaching methods. Finally, based on recommendations to overcome difficulties faced in the use of expository organizers, many of the teachers recommend that teachers be provided with seminars for capacity building and to better understand the teaching approach as they explained "*Seminars and conferences should be organized to help motivate teachers to use this method of teaching"."Organizing seminars for better teaching apprehension", "Organization of seminars on better teaching approaches*". Also, many of the teachers add that didactic materials be provided to aid the process as they stipulated "*More materials like laptops should be provided to make learning easier". "Provision of materials to aid the process*". Lastly, one of the teachers adds that teachers should be flexible in their teaching and use eclectic approach often to make understandingeasier.

Testing of Research Hypothesis

Ho: Expository organizers have no significant influence on students' Performance in biology.
Ha: Expository organizers have a significant influence on students' Performance in biology.

Statistically, the results showed that students in the experimental group who were taught classification using expository organizers (Mean 42.66±1.822) significantly (P-value 0.00< 0.05) performed far better than those in

the control group that were taught without the use of expository organizers (Mean 6.58±0.347) and the $t_{calculated\ value}$ is 19.452 > than the $t_{critical\ value}$ of 1.960. Consequently, the null hypothesis which states that expository organizers have no significant effect on students' performance in biology was rejected and the alternative hypothesis which states that expository organizers have a significant effect on students' performance in biology was accepted. Table 4

DISCUSSION

The results showed that students in the experimental group taught classification of living organisms using expository organizers significantlyperformed far better than those in the control group that were taught without the use of expository organizers.The test of hypothesis revealed that there was a statistically significant difference between the mean achievements score of students taught classification of living organisms using expository organizers with those taught without the use of expository organizers. Therefore, the null hypothesis which stated that expository organizers have no significant influence on students' performance in biology was rejected and the alternative hypothesis which stated that expository organizers have a significant influence on students' performance in biology was accepted. This is in compliance with the work of Bruner (1978) who theoretically believed that if students are helped to grasp the overall pattern of a field of study, they are more likely to remember what they learn, and understand the principles that can be applied in a variety of situations.

The theorist further explained that instruction should be designed to facilitate extrapolation and filling in the gaps. This involves going beyond the given of information. He stated this as "the most effective sequences in which to present material". This is in order for the learner to be able to apply knowledge acquired in the learning process. This is also in accordance with the Gestalts theoretical backing of global perceptual organization which indicated that insightful learning is a form of problem-solving in which the individual develops a sudden insight into or understanding of a problem's solution. They opined that the acquisition and retention of insight form the core of learning behavior. Learning resulting to insight can be characterized by sudden identification of a solution to a problem that has bothered one for so long. The theorists were also of the opinion that solving a problem with previous experiences and what is already known is as a result of reproductive thinking.

More so, a greater part of the students with a high mean score indicated that expository organizers facilitated their learning while a few of them disagreed. All of the teachers in their own part said expository organizers are effective, increase students' comprehension for a short-term or long-term period, increase thinking capacity, increase performance, and increase class participations and engagement in lessons. The findings concurs with that of Owoeye (2016) results who based on analyses showed that no significant difference existed between the performances of students in experimental and control groups involved in the study at pretest, however, students' achievement in the experimental group at post-test level was found to be significantly better than that of the control group. This showed that advance organizer teaching strategy especially the expository organizer significantly influenced students' academic performance in biology in junior secondary school.

CONCLUSION

The results indicated that a statistically significant difference existed between the mean differences scores of students taught classification of living organisms using expository organizers with those taught without the use of expository organizers in favor of those taught using expository organizers. The positive relationship implied that students taught using expository organizers had higher chances of performing far better than those taught without the use of expository organizers given the fact that they could present biological concepts in different phases, relate to the main concepts, identify unfamiliar words, make use of learned concepts and recall facts easily. Based on the findings of this study, it can be concluded that expository advance organizers have significant effects on students' performance in biology. They are seen to be more powerful in improving students' performance in biology than the conventional method trending in the nation's classrooms. Therefore, enhancement in students' performance is an outcome of a combination of innovative teaching strategies used by teachers such as use of expository advance organizers.

Recommendations

With regards to the findings discussed in this study, the following recommendations were made:It is recommended that teachers should be involved in the effective structuring of learning and organization of learning materials in biology because this will go a long way to make the teaching-learning process easy and interesting. Lessons should be well arranged so as to ease understanding. Well-structured lesson plans enable learners to discover the patterns and relationships between concepts. Through this discovery, learning will be meaningful, thereby facilitating retention and transfer. Teachers should teach students' how to construct and use advance organizers to facilitate their learning. This can be done through the organization of seminars and training programs involving teachers and students. It is also recommended that teachers should adopt the advance organizer method which is a student centered

method of teaching. Students learn better when they are actively involved in the teaching-learning transaction. Teaching approaches which are activity-based enhance understanding of biological concepts and increases students' ability to acquire scientific skills in life.

Workshops, seminars, re-fresher courses and in-service training should be organized by regional and divisional pedagogic inspectors for biology teachers and other sciences in an effort to improve teachers' knowledge and understanding on the use of advance organizer teaching methods. This might keep teachers abreast with the use of innovative teaching methods such as advance organizer teaching methods. It will also encourage as well as enable teachers to plan and deliver their lessons effectively.The government/ministry of secondary education should provide more adequate qualified, effective, and competent biology teachers to all the secondary schools in the Limbe Municipality.

REFERENCES

Amaele S (2010). *History of Education in Nigeria.* Nigeria, National open university of Nigeria press.

Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norman MK, Mayer

Atomatofa R (2007). Effects of advanced organizers on attainment and retention of students' concept of gravity in Nigeria. *Int. J. Res. Stud. Edu. Technol. 2(1)* DOI:10.5861/IJRSET.2013.363

Ausubel DP (1960). The use of advance organizers in the learning and retention of meaningful verbal materials. *J. Edu. Psychol. 51, 267-272.*

Ausubel DP (1963). *The psychology of meaningful verbal learning*. New York: Grune &Stratton.

Ausubel DP (1968). *Educational psychology: A cognitive view*. New York: Holt, Rinehart and Winston

Ausubel DP (2000). *The acquisition and retention of knowledge: A cognitive view*.

Ausubel DP, Fitzgerald D (1961). The role of discriminability in meaningful parallel learning and retention. *J. Edu. Psychol.* (52), 266-274.

Ausubel DP, Fitzgerald D (1962). Organizer, general background, and antecedent learning variables in sequential verbal learning. *J. Edu. Psychol.* (53),243-249.

Ausubel DP, Youssef M (1963). The role of discriminability in meaningful parallel learning. *J. Edu. Psychol.* (54), 331-336

Ausubel, D. P. (1978). In defense of advance organizers: A reply to the critics. *Review of Educational Research, 48, (2), 251-257.*

Awodun AO (2016). Effects of advance organizer teaching approach on students' academic performance in physics in senior secondary school in Ekiti State, Nigeria. *Int. J. Res. Analytic Rev.* 2349-5138.http*://ijrar_issue_293.pdf*

Boston: Kluwer Academic Publishers.

Creswell JW, Plano Clark VL, Gutmann M, Hanson W (2003). Advanced mixed methods research designs: In Tashakkori A. & Teddlie C. (Eds.). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks, CA: Sage

Damola BT, Femi A (2004). Effects of concept mapping techniques on senior secondary students' achievement and retention in ecology. *J. Sci. Teachers Assoc. Nig. 39(1&2) 32-38.*

Eche PI (2010). Effect of advance organizer on SS1 students' achievement in Biology in Otukpo Metropolis. Unpublished M.Ed Thesis. Makurdi, Benue State University.

Igboegwu EN (2012). Effects of guided inquiry and demonstration teaching methods on achievements of chemistry students of different levels of scientific literacy. *J. Res. Curr. Teach. 6 (1), 445-458.*

Jitzi and Shafack (2019). The impact of laboratory based teaching method on students' cognitive achievement in biology in secondary schools in the Littoral Region of Cameroon. *Int. J. Innov. Res. Knowl.* vol-4 Issue-4. www.ijirk.com

Joyce BR, Weil M, Calhoun E (2015). *Models of Teaching* (9th Ed.). New Jersey: Pearson Education.

Mayer RE (2003). *Learning and Instruction*. New Jersey: Pearson Education Ins.

Nekang FN, Agwagah UN (2010). Effect of concept mapping on students' achievement and interest in elementary probability in Cameroun. *J. Edu. Leadership Develop. 2*.

Nsamenang AB (2004). *The Teaching-Learning Transaction: an Africentric Approach to Educational Psychology.* Bamenda: H.D.R.C Publications.

RE (2010). *How Learning Works*: *Seven Research-Based Principles for Smart Teaching.* San Francisco*:* Jossey-Bass

Shihusa H, Keraro FN (2009). Using advance organizers to enhance students' motivation in learning biology. *Eur. J. Math. Sci. Technol. Edu. 5(4), 413-420*DOI:10.12973/ejmste/75290

UNESCO (2017). Education transforms lives. http://www.unseco.org