

EFFECT OF LESSON PRESENTATION ORDER AND BEHAVIOURAL OBJECTIVES AS SET INDUCTIONS ON STUDENTS' ACHIEVEMENT IN SECONDARY SCHOOL BIOLOGY

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ABSTRACT

This study investigated the effect of lesson presentation order and behavioural objectives as set inductions on the academic achievement of students in Biology at the Senior Secondary School level in Katsina-Ala metropolis, Benue State. Three research questions and one null hypothesis were formulated to guide this study. The design adopted for this study was non-randomized pre-test - post-test - control group quasi-experimental design. This study employed a sample of 96 students in four intact classes. The four classes were randomly assigned to the experimental and control groups. Experimental groups A, B and C had presentation order, behavioural objective and presentation order-behavioural objective respectively as set inductions while group D; the control group was not treated to any of the two set inductions. The instrument for data collection was Biology Achievement Test (BAT) that consisted of 30 items on the mammalian blood circulatory system taken from multiple choice test papers of West African Examination council (WAEC) from 2010-2017. The split-half reliability coefficient for BAT was 0.63. Kruskal-Wallis test was used to test the null hypothesis ($p > 0.05$). The results of the study showed that, the post-test mean achievement scores of the groups were; presentation order $X = 13.31$ ($SD = 3.35$) with a mean gain score of 1.62; behavioural objective $X = 13.30$ ($SD = 1.05$) with a mean gain score of 1.90; presentation order-behavioural group $X = 14.64$ ($SD = 2.67$) having a mean gain score of 2.35 and control group $X = 13.55$ ($SD = 2.50$) having a mean gain score of 1.82. Even though there were differences in the mean achievement scores of the groups, the differences were statistically not significant; Kruskal-Wallis test $X^2(2) = 4.474$, $p = 0.215$. The finding of this study notwithstanding, Biology teachers should endeavor to expose the presentation order and behavioural objectives of every lesson to their students as a set induction since this has exhibited some tendency to enhance classroom learning, and hence students achievement in Biology

Keywords: Achievement, Behavioural objectives, Lesson Presentation order and Set induction

INTRODUCTION

Biology is a scientific discipline that studies the processes living of organisms including humans. The innumerable contributions of Biology in the life of man are glaringly seen in the roles of biological science disciplines such as biomedical, agricultural and environmental sciences. Considering these critical role of Biology in enhancing human development, it is therefore imperative that the learning of Biology in schools especially at the secondary education level shouldn't be toyed with, given that this is the level at which the learning of rudiments of biological sciences commences, and the level at which students begin to nurse career aspirations in biological sciences with some very strong elements of commitment.

Effect of Lesson Presentation Order and Behavioural Objectives as Set Inductions on Students' Achievement in Secondary School Biology

Besides these, secondary school Biology is a very strong basic requirement for the study of biological sciences and other related disciplines at a higher educational level. Therefore, the meaningful learning of Biology for enhancement of students' academic achievement is very fundamental.

When this significant place of students' achievement in Biology at the secondary school level in Nigeria is considered, the persistent underachievement of the Nigerian student in Biology over the years is very worrisome. This situation is evidenced by the statistics on students' achievement in the Senior School Certificate Examination (SSCE) in Biology conducted by West African Examination Council (WAEC). The yearly percentages of students who obtained credit passes in Biology from 2003 - 2014 were as follows: 2003 (42.22%), 2004 (29.68%), 2005 (35.74%), 2006 (49.23%), 2007 (33.37%), 2008 (33.94%), 2009 (31.39%), 2010 (38.75%), 2011 (36.56%), 2012 (31.81%), 2013 (34.59%) and 2014 (37.42%). A salient feature of these statistical records is that students' achievement has persistently remained below 50 percent. The implication of this is that less than half of all students who sit for SSCE in Biology fail to obtain the prerequisite grades to pursue Biology oriented careers at higher educational level. This situation is an index to a bleak future for biology-associated developmental benefits,

A number of studies have revealed that this unfortunate situation facing the teaching and learning of Biology is being precipitated by several factors, the strongest being teachers' use of ineffective pedagogical approaches and practices (Abdul & Duyilem, 2003; Bessong & Obo, 2005; Adaramola & Obomunu, 2011; Okigbo & Osuafor, 2013). This most probably stems from teachers' use of instructional approaches in the wrong context since all instructional approaches when used in the appropriate context can promote meaningful learning. Besides this, the learning benefits of an appropriate instruction approach can be marred by several factors, one of which is the non-receptive mind set of the learner. Thus, it behooves the teacher to ensure that students are gingered up and put in the right mood to learn. This entails provoking students' interest and curiosity as well as capturing and holding their attention. The act of doing this is described as set induction or anticipatory set (Grable, 2017), and it is most appropriately done prior to presenting new knowledge at the introductory phase of a lesson. Set induction being a valuable aid to learning, the teacher must think out activities that can effectively put students in the right frame of mind to motivate them and facilitate their learning. It is in line with this that there is a thinking that using order of presenting the new information (that is the step by step manner in which the new concept is to be learned in a lesson), and the behavioural objectives (the intents) of the lesson as set induction can influence students learning positively. Thus, it is against this backdrop that this study intends to ascertain the effect of presentation order and behavioural objectives of a lesson as set induction on students' achievement in Biology at the secondary school level.

STATEMENT OF PROBLEM

The persistent underachievement of the students Biology at the secondary education level in Nigeria today as depicted by West African School Certificate Examination results has remained a matter of serious concern to educationists and other stakeholders. Therefore, there is every need to evolve ways of arresting this situation. Since Biology teachers' unproductive pedagogical practices are strongly indicted here, the most obvious solution lies strongly on finding and using potent pedagogical practices. In this regard, one pedagogical practice that may probably influence meaningful learning and enhance students' achievement in Biology is the use of lesson presentation order and behavioural objectives as set induction. It is on this premise that this study intends to examine this pedagogical practice, coupled with the fact that researches on presentation order of a lesson and a combined effect of lesson presentation order and behavioural objectives as set induction have never been conducted.

Objectives of the Study

1. Determine the effect of lesson presentation order as set induction on students' achievement in Biology.
2. Find out the effect of lesson behavioural objectives as set induction of lessons on students' achievement in Biology.
3. Determine the effect of presentation order - behavioural objectives of lessons as set induction on students' achievement in Biology.

Research Questions

1. What is the mean achievement score of students taught Biology with lesson presentation order as set induction?
2. What is the mean achievement score of students taught Biology with behavioural objectives as set induction?
3. What is the mean achievement score of students taught Biology with lesson presentation order - behavioural objectives as set induction?

Research Hypothesis (H₀)

There is no significant difference in the mean achievement scores of students taught Biology with and those not taught without presentation order, behavioural objectives, presentation order-behavioural objectives as set induction

LITERATURE REVIEW

The general intent of an organized classroom teaching activity is for students to meaningfully learn. This lies squarely on the Biology teachers adequately planning that entails drawing out an adequate lesson plan. In a well-developed lesson plan, there is one very crucial phase which if not well articulated could inhibit learning. This phase is the introductory phase. Louise Avery (2016) observed that introduction in a lesson is the most important step because it "hook" the students attention and sets the stage for the rest of the lesson. In addition, introduction prompts students' curiosity and enthusiasm, captures and holds their attention (Dorit, 2017). Introduction can be done by way of asking thought provoking questions, showing pictures related to the topic, telling a story to show the importance of the topic, and bringing real objects related to the lesson and clearly stating the objectives of the lesson (Brophy, 2001; Louise a very, 2016 & Sasson, 2017). These introductory activities constitute what is termed set induction.

Set Induction

Yusuf (2017) and Aubertine (2015) described set induction as a set of steps taken by the teacher to start a lesson or classroom activity. This gets the students ready and in the right frame of mind-set to learn. This entails motivating the students and getting them interested in the lesson, getting the students ready and focused or thinking about what is to be learned and, catching the students' attention and preparing them for that particular lesson. Set induction can be either motivating or facilitating (Grable, 2017). The latter emphasize the cognitive aspects of a new lesson serving as advance organizers while the former is affective domain based. According to Koballa (2008) affective domain is not just a simple catalyst but a necessary condition for learning to occur. Denton and McKinney (2004) asserted that the affective domain can be used to support internalization of the cognitive content and foster the development of curriculum, and industry-related interest, attitude, value and practices.

Two aspects of a well-planned lesson that could plausibly influence students' learning and hence impact on their achievement if used by Biology teachers as set induction are presentation order and behavioural objectives of lessons.

Effect of Lesson Presentation Order and Behavioural Objectives as Set Inductions on Students' Achievement in Secondary School Biology

Lesson Presentation order

An aspect of the lesson plan thought of as having potential for aiding learning and therefore capable of enhancing students' academic achievement if used as a set induction is lessons presentation order. Lesson presentation order is simply the sequential manner the main aspects of a topic to be learned in a lesson will be presented by the teacher, and it spells out the flow order of the lesson. Outlining the sequential order of presentation to students as set induction may:

- Helps to focus the student attention on the main aspects of the lesson
- Provides a logical order of a lesson flow for students to see
- Enables teachers ensure smooth flow of the lesson.
- Provide students with an insight into content of what is to be learned
- Ensures the full coverage of all your main points of the lesson,
- Helps the student organize their thoughts on the new material learned.
- Helps the student to organize his /her ideas about a topic during revision for examination
- Helps teachers to be focused on their presentation and to achieve a quality work desired, thus impressing their students.

These significant roles of presentation order of a lesson may have some positive implications for meaningful learning culminating in the enhancement of students' academic achievement if used as set induction.

BEHAVIOURAL OBJECTIVES

Behavioural objectives according to Purdue University Northwest (2017) are learning outcomes stated in observable and measurable terms which gives direction to the learner and becomes the basis for students' evaluation. Regarding the learning significance of learning objectives, Hunter (2017) observed that clear, well thought-out objectives are really important to students because they communicate expectations to the student. Therefore presenting behavioural objectives as set induction is advocated by some educators. Draper (2009) acknowledged the using objectives as set induction:

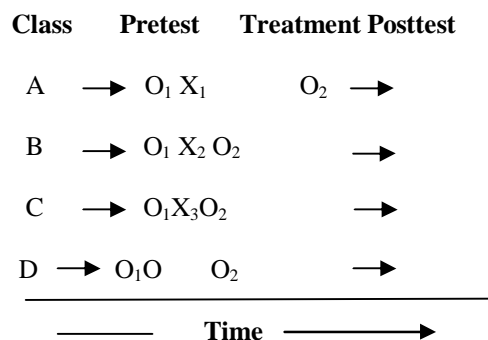
- Direct students attention during a learning activities
- Enable students organize their revision work
- Makes straightforward note taking by the student during a lesson because it directs the student to major points.
- Assist the student in studying more effectively and efficiently because they help students to organize content material in line the important information and what is expected from them and
- Finally, students can use behavioural objectives to think of likely examination questions.

By implication, these important roles of prior knowledge of behavioural objectives in learning should enhance students' achievement. Studies on the effect of this practice on students' achievement have yielded contradictory results. Draper (2009), Awah, Inakwu, Agbama and Odey (2015) Ndem and Arikpo (2016), Osuafor and Ijoku (2016) established that exposing behavioural objectives to students prior to teaching enhanced academic achievement. On the contrary, Ogungbesan (1994), Eneogwe (1996), Ojerinde, (1998) and Ajagun, (2002) demonstrated that prior knowledge of behavioural objectives had no positive influence on students' achievement.

Design of the Study

The design employed in this study was the non-randomized pre-test - post-test-control group quasi-experimental design shown below.

Non-Randomized Group Pretest-Posttest-Control Group Design



- A = Experimental group treated to lesson presentation order
- B = Experimental group treated to behavioural objectives
- C = Experimental group treated to lesson presentation order and behavioural objective
- D = Control group (No treatment)

SAMPLE AND SAMPLING TECHNIQUE

This study employed a sample of 96 Senior Secondary School II Students in their intact classes. The students in experimental group A (lesson presentation order group) were 26, experimental group B (behavioural objective group) had 20 students and experimental C (lesson presentation order and behavioural objective group) had 28 students and the control group had 22 students. The groups were sampled by into the experimental and control groups by simple random sampling technique using the lottery method

Instrument for Data Collection

The instrument for collecting data in this study was the Biology Achievement Test (BAT) which was on the Mammalian Blood Circulatory System. Two versions; the pre-test and post-test versions of this instrument were developed with the same items drawn from past Biology objective test questions of West African Examination Council (WAEC) from 2010-2017. BAT consisted of 30 objective test items. A table of specification was used to determine the number of items in the different cognitive ability levels.

Validation and Reliability of the Instrument

Three experts validated the Biology Achievement Tests (BAT). These experts were a Test and Measurement expert, a Biology educator and a Biology teacher with more than five years teaching experience. The reliability of Biology Achievement Test (BAT) which was determined using the split-half method was 0.63.

Data Collection Procedure

The pre-test was administered to the groups prior to treatment which lasted for two weeks. All the groups were taught eight lessons each by the same experienced secondary school Biology teacher using Power-Point projection. Students in the presentation order group had the sequential steps of the presentation phase of each lesson exposed to them at the introductory phase as set induction. Students in the behavioural objective group had the behavioural objectives of their lessons exposed to them at the introductory phase while those in the presentation order -behavioural objective group were treated to the presentation order and behavioural objectives of each lesson at the introductory phase of each lesson. The control group was treated to neither presentation order nor behavioural objectives of their lessons. At the end of the treatment period the different groups were immediately subjected to post-tests.

Effect of Lesson Presentation Order and Behavioural Objectives as Set Inductions on Students' Achievement in Secondary School Biology

METHOD OF DATA ANALYSIS

The statistical tools used for data analysis in this study were; mean, standard deviation and Kruskal-Wallis test. The choice of this test was due violation of key assumptions of ANOVA and ANCOVA tests. The SPSS Package version 21 was used for all data analysis.

RESULTS

Presented in Table 2 are the pre-test and post-test means, standard deviations and mean gain scores of students in the experimental and control groups. As shown in Table 2, the presentation order group had a pre-test mean score of 11.76 (SD = 1.55) while the post-test mean score was 13.31 (SD = 3.35). This group had a mean gain score of 1.62. The behavioural objective group had a pre-test mean of 11.40 (SD = 2.2) and a post-test mean of 13.30 (SD = 1.1). The mean gain score for this group was 1.90. The presentation order-behavioural objective group had pre-test and post-test mean scores of 12.29 (SD = 1.5) and 14.64 (SD = 2.67) respectively. The group had a mean gain score of 2.35. The control group mean pre-test and post-test means were 11.73 (SD = 1, 70) and 13.55 (SD = 2.5) respectively with mean gain score of 1.82.

TABLE 2: PRE-TEST AND POST-TEST MEANS, STANDARD DEVIATION AND MEAN SCORE GAINS OF CONTROL AND EXPERIMENTAL GROUPS

Group	Pre-test	Post-test	Mean Gain Score
Presentation Order	N	26	26
Mean	11.69	13.31	1.62
Std. Deviation	1.55	3.35	
Behavioural Objective	20	20	
N			
Mean	11.40	13.30	1.90
Std. Deviation	2.2	1.10	
Presentation Order Behavioural Objective	-	28	28
N			
Mean	12.29	14.64	2.35
Std. Deviation	1.49	2.67	
Control	N	22	22
Mean	11.73	13.55	1.82
Std. Deviation	1.70	2.50	

Hypothesis Testing

H₀ There is no significant difference in the mean achievement scores of students taught Biology with and those not taught without presentation order, behavioural objectives, and presentation order-behavioural objectives as set induction

Presented in Table 2 is the Kruskal-Wallis test for difference in the post-test mean achievement scores of students in the experimental and control groups

TABLE2: KRUSKAL-WALLIS POST-TEST RESULTS OF DIFFERENCE IN THE MEAN ACHIEVEMENT SCORES OF STUDENTS IN ALL GROUPS

Test Statistic	Post-test
Total Number	96
Kruskal-Wallis	4.474
Degree of Freedom	3
Asymptotic Sig.	0.215

Kruskal-Wallis test $\chi^2(2) = 4.474$, $p = 0.215$ for the difference in post-test mean achievement of students in all groups. Therefore since $p > 0.05$, there is statistically no significant difference in the mean achievement scores of students in all the groups.

DISCUSSION

This study examined the effect of the use of lesson presentation order, behavioural objective and presentation order-behavioural objective as set inductions on the achievement of students in Biology at the secondary school level. The analysis of data showed that there was no significant difference in the achievement of students in the lesson presentation order, behavioural objective presentation order-behavioural objective and control groups. However, comparatively, presentation order-behavioural objective group had the largest mean score gains of 2.35, followed by the behavioural objective group with 1.90; the control group had 1.82 and the presentation order group having the least mean score gain of 1.62. The achievement gains of the presentation order-behavioural objective group which was the highest among the groups would most likely be attributed the combined effect of the a presentation order and behavioural objective with the former being largely responsible as seen in the groups mean gain score, even though no significant difference was found between the behavioural group and control group, a finding that agreed with the findings of Ogungbesan (1994), Eneogwe (1996), Ojerinde, (1998) and Ajagun, (2002). On the contrary, this finding however disagreed with the findings of Draper (2009), Awah, Inakwu, Agbama and Odey (2015) Ndem and Arikpo (2016), Osuafor and Ijoku (2016) whose studies reported that prior knowledge of behavioral objectives significantly influenced students achievement. The findings of this study could generally be ascribed to the motivational nature of the set inductions that served as catalysts (Koballa, 2008) and not facilitating the cognitive aspect of the lessons. Thus being motivational only, the set inductions were not potent enough to impact strongly on what was learned.

CONCLUSION

The purpose of this study was to ascertain the efficacies of using lesson presentation order, behavioural objectives and lesson presentation-behavioural objectives as set induction on students' achievement in Biology at the secondary school level. From the analyses of data, the study found no significant difference in the mean achievement scores of the different groups. However the lesson presentation-behavioural objectives group had the highest mean achievement gain score followed the behavioural objective group and least by the presentation order group. Thus, the use of a lesson presentation order and behavioural objectives in Biology lesson as set induction exhibited some potentials of enhancing learning of Biology culminating into greater achievement.

Effect of Lesson Presentation Order and Behavioural Objectives as Set Inductions on Students' Achievement in Secondary School Biology

RECOMMENDATIONS

Based on the findings and discussions of this study, the use of behavioural objectives and lesson presentation order as set induction should be advocated among teachers of Biology most especially in situations where the teachers lack what to use as potent set induction. A similar study should be conducted in order to authenticate the findings of this study.

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