

Effect of Target Task Approach on Students' Ability level and Retention in Senior Secondary Chemistry in Delta State, Nigeria

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Abstract

The study was aimed at using Target Task Approach to bridge the ability gaps of students in Secondary School Chemistry. It adopted a pretest, posttest, delayed quasi-experimental design with a sample size one hundred and seventeen students in both the experimental and control groups. Three research questions and hypotheses were raised and formulated to guide the study. The instruments for the study includes a Chemistry Achievement test (CAT) and Scholastic Ability Test. The instrument were validated and their reliabilities established. The reliability coefficient of both instrument using the Kudar-Richardson formulae 21 and Chromberg alfa were 0.89 and 0.72. Mean and standard deviation were used to answer research questions while the independent t-test was used in testing the hypotheses. The result showed a no significant difference on achievement and retention of low and high ability students taught Chemistry using Target Task Approach.

Keywords: Target Task Approach, Ability Level, Retention, Chemistry.

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INTRODUCTION

Target task approach (TTA) is a student-centred, problem solving model. The model is adopted from guided discovery method for teaching science, it is a task improved learning approach that requires knowledge transfer from a source task or related task to other targeted tasks. TTA helps to teach both content and languages and involves breaking down of skills into smaller or more manageable components (Szidon & Franzone, 2009). TTA is a simple activity based approach that uses tasks targeted at contents, often contrasted with traditional method; it introduces a set of language forms before allowing learners to practice in controlled conditions and then encouraging them to use the forms spontaneously (Wills & Willis 2007). The approach is geared towards identifying major problems and solving them through rules and principles. The approach is applicable to science teaching. It also requires the teacher's presentation of typical solutions similar to the target task and a guide to the students in order to solve target task.

TTA involves several stages; generally six major stages have been noted: pre-task, task, planning,

report, analysis and practice (British Council, 2015, Olaniyan & Omosewo, 2015).

- Pre-task – it involves the introduction of the topic, clear explanation of the topic to students' understanding and provision of similar task or model so as to promote acquisition. It is a preparatory activity that makes plain all that is needed to affect the task. The possible sub-steps taken are: Prepare students for the task; Provide similar task as model; Preparatory activities is made for the task and Strategic planning on how to carry out the task within the given time is made.
- Task –this is the work phase, the period which the student is engaged in the task directly either in pairs or groups while teacher guides or monitors the activities. The students are not left alone but guided within the stipulated time. The teacher plays a supervisory role in ensuring the task is achieved by the students as required. Students are allowed to access as many inputs data and introduce relevant element into the task while they perform the task.
- Planning – this is the post-task phase, it requires students' preparing report on the task while doing the task. The procedures and steps for

doing the task are noted at each stage. This is to enable repetition of task, encourage reflection on how the task is performed, exposed areas or forms that are problematic to learner when preparing the task and help focus on the different forms of difficulty experienced in order to allow for review of errors and retention.

- Report – this is the stage where students submit their report to the teacher for evaluation, assessment and correction.
- Analysis – this is when the relevant areas of the task reported are highlighted by the teacher for the purpose of complete acquisition of knowledge.

- Practice – this is the last stage of the task. The students are engaged in further practice having gained adequate knowledge from the task under gone. This is similar to assignment, class work project and so on.

Ellis (2014), TTA is classified into three principal phases namely; pre-task, during task and post-task. Review of the phases show that the three phases correspond to the six steps identified by the British Council (2015), and Olaniyan & Omosewo (2015). Phase one “Pre-task” correspond with step one, Phase two “During task” correspond step two, three while Phase three “Post task” correspond step four, five and six. Below is the classification as shown in Table 2.

Table 2: Ellis 3 principal phase

	Phase		Target model	task
A	Pre-task	Framing activity, planning time doing similar task	Pre-task	Introduction of topic Explanation of task Examples of task
B	During task (task cycle)	Time presume	Task Planning report Report	Doing task in pairs or groups Teacher monitoring students Noting of all steps during step in report format Assessment of report, correction eradication
C	Post task language focus	Learner report Number of participants Consciousness raising Repeat task	Analysis Practice	Highlights of areas of problem relevant parts etc Further area of practice or repetition of task

A task based learning framework (Willis 1996, Ellis, 2017, Olaniyan & Omosewo, 2015)

TTA creates opportunity for language learning concept mastering, skills development & knowledge building. This is made effective through pair or collaborative work (Ellis, 2017). It is useful in selection of options for design for further lesson. It supports fluency, accuracy & natural acquisition, develops appropriate orientation to learning, creates avenue for students to evaluates their performance themselves, make way for progress and activeness. (Ellis, 2017). Besides the above mentioned issues, Learners’ ability, language acquisition and competence to perform a task are also enhanced as they improve on the task; learners are further empowered on mastery of language or concept with constant practice (Gass & Meckey 2007; Hawkes, 2012; Townsend-Cartwright, 2014). Consequently, it will inspire Chemistry learners and enhance acquisition of concepts for mastery purpose.

Concept of Ability Level

Ability level as often termed as ability grouping, has been in practice in schools for about century and its earliest reviews of research were found between 1920s and early 1930s when there was a mental testing movement in American education (Kulik, 1992). Thus far, the concept of ability levels or groupings has produced a great deal of research concerning its effects on student learning. Adesoji (2008) said students are not the same especially when we find out the rate at which

facts and principles in sciences are being assimilated. This is to say that, there is disparity in the ability of students to perform specific tasks. It is believed that each individual has some level of potential which helps them in retaining and giving information. This potential can be likened to ability; this ability differs with individual and places the learner at his/her best. Adodo and Agbayewa (2011) defined ability as a practice of dividing students for instruction on the basis on their perceived capabilities for learning. In this regard, they are placed on similar academic level within the same groups for instruction. It should be noted that disparity exists in their ability to perform specific task.

Ability grouping can be categorized into homogeneous and heterogeneous groupings. Homogeneous grouping are those whose ability level are within class grouping with the same potential while heterogeneous grouping are those students of different ability mixed together within a class. However, most classrooms of learning are heterogeneous because of the extent of interaction within the wide range of people (Adesoji, 2008; Adodo & Agbayewa, 2011; Hemmati & Sadeghi, 2015). Ability levels differ in individuals; this is as a result of the differences in learners’ grades due to differences in their intelligence quotient (Hemmati & Sadeghi, 2015). These differences have placed students as high ability level (gifted) students, average ability

level students, low ability level students or handicapped. When all these levels are mixed together in a class, it is called heterogeneous grouping method but if they separated into their likes, they are called homogeneous grouping method. Studies have shown that homogeneous grouping method is better since students learn well and compete at a similar speed. Notwithstanding, heterogeneous grouping method is also advantageous because of the provision for cooperative learning, peer tutoring, multi-level teaching, social interaction and so on (Sepon-Shrein, 2003; Thomas & Feng, 2014). The ability to solve problems in Chemistry by different ability level students can therefore be enhanced using a good teaching approach.

Studies have reviewed the Effects of Target Task Approach (TTA) on Students' Achievement in Chemistry. Adesoji (2008) observed a no significant difference in the performance of students in posttest after exposing them to TTA strategy in Chemistry Class. Nbina (2011) Found that students' taught physical chemistry using the target task approach (TTA) performed significantly better Expository method in teaching physical chemistry in Rivers State. Mandina and Eshiwet (2018) revealed a significant difference between TTA group and conventional group with $F(2, 109) = 0.598$, $p = 0.019$ in the performance of advanced level chemistry students in electrochemistry. Espinosa, monterola and Punzalan (2013) showed that there was no significant improvement between the mean score for the posttest of Career-Oriented Performance Task and Traditional Teaching Approach when used within a short period of time.

TTA emphasizes interaction among pairs or group and between students and teacher. It eliminates teacher dominance hence natural acquisition, and fluency is enhanced. It improves motivation and satisfaction. It also offers a principle approach to language, concept teaching and provides interactions which foster learning. Therefore, the problem of this study is: will the use of Target Task approach bridge the achievement and retention gaps of low and high ability levels in Chemistry?

Research Questions

The following research questions were raised:

1. What is the difference in students' achievement scores in Chemistry between students of high and those of low ability levels when taught using Lecture method?
2. What is the difference in students' achievement scores in Chemistry between students of high and those of low ability levels when taught using Target Task Approach (TTA)?
3. What is the difference in mean retention scores in Chemistry between students of high and those of low ability levels using Target Task Approach (TTA)?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

HO₁: There is no significant difference in students' mean achievement scores in Chemistry between students of high and those of low ability levels using the Lecture method.

HO₂: There is no significant difference in students' mean achievement scores in Chemistry between students of high and those of low ability levels using Target Task Approach (TTA).

HO₃: There is no significant difference in mean retention scores in Chemistry between students of high and those of low ability levels using Target Task Approach (TTA).

METHODOLOGY

The study is a pretest, posttest, delayed test quasi-experimental design study. The study sampled one hundred and nineteen participants from six schools through simple ballot. Fifty seven for experimental groups while sixty two for control groups. Two research instruments were used: Chemistry Achievement Test (CAT) which consists of fifty multiple choice items selected from Past West African Examination questions and Scholastic Ability test which consist of thirty multiple test items from their last promotion examination. The instrument where found valid in content and face. Their reliabilities were estimated using Kuder-richardson formulae 21 and Chromberg alfa. The reliability co-efficient of 0.89 and 0.72 were obtained and thus, administered.

The treatment began with obtaining formal permission from the authorities of the sampled schools. The teachers in the experimental groups' schools served as the research assistants and were trained on how to implement Target Task Approach in the classroom. This was followed by issuing both the scholastic ability test and CAT for pretest scores. The next stage was the teaching of the participants using TTA which lasted for six weeks on the concepts of (i) laws of chemical combination (law of conservation of mass, law of definite proportion, law of multiple proportion and (ii) gas laws (Boyle's law, Charles' law, general gas law, Dalton's law of partial pressure. The next stage was administering posttest after two days after treatment and delayed test a month after treatment.

The same procedure was followed for the groups under lecture method, but were taught using lecture method. For research assistants under these groups, there was no need for training because they were used to lecture method. In assigning participants into their ability groups, students who scored 60% and above were regarded as high ability participant while those who scored 45% below were regarded as low ability participants.

RESULTS AND DISCUSSIONS

The presentation of results began with the analysis of research question.

Research question 1: what is the difference in students' achievement scores in Chemistry between students of high ability level and those of low ability level taught using Lecture method?

To answer this research question, the mean and standard deviation of the post-test mean achievement scores of the students in Chemistry between low and high ability level students using lecture method were computed and compared as shown in Table 1.

Table 1: Mean and Standard Deviation of post-test mean achievement scores of high and low ability level students taught chemistry using lecture method

Ability	N	Mean	SD	Mean diff.
High	32	27.6875	5.59053	11.62083
Low	30	16.0667	3.44347	

Table 1 showed post-test mean achievement scores of 27.6875 with standard deviation of 5.59053 for high ability level students taught chemistry using lecture method while post-test mean achievement scores of 16.0667 with standard deviation of 3.44347 for low ability level students taught chemistry using lecture method. However, the mean difference between the high and low ability level students showed 11.62083 while

that of the standard deviation was 2.14706. The mean difference of 11.62083 is in favour of high ability level students.

In determining whether the difference was significant, t-test was employed and the result is presented in table 2 below.

Table 2: Summary of t-test comparison of post-test mean achievement scores of high and low ability level students taught chemistry using lecture method

Ability	N	Mean	SD	Df	Sig.	t	P value	Decision
High	32	27.6875	5.59053	60	.003	9.776	.000	Significant
Low	30	16.0667	3.44347					

Table 2 revealed that there is significant difference between the post-test mean achievement scores of high and low ability level students using lecture method with $t(9,776) > P(0.000)$. Hence, H_0_1 is rejected. Therefore, there is a difference in the mean achievement scores between high and low ability level students using lecture method.

Research question 2: To answer this research question, the post-test mean achievement scores of the students in Chemistry between low and high ability level students using target task approach (TTA) were computed and compared as shown in Table 3.

Table 3: Mean and Standard Deviation of post-test mean achievement scores of high and low ability level students taught chemistry using TTA

Ability	N	Mean	SD	Mean diff.
High	38	32.2368	6.20128	0.6579
Low	19	31.5789	7.91142	

Table 3 showed post-test mean achievement scores of 32.2368 with standard deviation of 6.20128 for high ability level students taught chemistry using TTA while post-test mean achievement scores of 31.5789 with standard deviation of 7.91142 for low ability level students taught chemistry using TTA. However, the

mean difference between the high and low ability level students indicated while that of the standard deviation was 0.88008. The mean difference of 0.6579 is in favour of high ability level students. To know whether the mean difference was significant, hypothesis two was tested and the result is presented in table 4.

Table 4: Summary of t-test comparison of post-test mean achievement scores of high and low ability level students taught chemistry using target task approach (TTA)

Ability	N	Mean	SD	Df	T	Sig.
High	38	32.2368	6.20128	55	0.344	0.732
Low	19	31.5789	7.91142			

Table 4 shows $t(0.344) < P(0.732)$ which indicate a no significant difference between the post-test

mean achievement scores of high and low ability level students using TTA. Hence, H_0_2 is accepted. Therefore,

there is no significant difference in the mean achievement scores between high and low ability level students using TTA.

Research question 3: What is the difference in mean retention scores in Chemistry between students of

high ability level and those of low ability level using Target Task Approach (TTA)?

To answer this research question, the mean retention scores of the students in Chemistry between low and high ability level students using TTA were computed and compared as shown in table 5

Table 5: Mean and Standard Deviation of test of retention scores of high and low ability level students taught chemistry using target task approach (TTA)

Ability	N	Mean Diff	SD	Mean diff
High	38	29.9737	6.39885	0.7632
Low	19	29.2105	8.39695	

Table 5 showed test of retention mean scores of 29.9737 with standard deviation of 6.39885 for high ability level students taught chemistry using analogy method while the mean retention scores for low ability level students using analogy method indicated 29.2105 and its standard deviation being 8.39695. However, the mean difference between the high and low ability level students indicated 0.7632.

Ho₃: There is no significant difference in mean retention scores in Chemistry between students of high ability level and those of low ability level using Target Task Approach (TTA). This hypothesis was tested by comparing the mean and standard deviation of the test of retention scores of high and low ability level students who were taught with TTA using t-test as shown in Table 6.

Table 6: Summary of t-test comparison of test of retention mean scores of high and low ability level students taught chemistry using target task approach (TTA)

Ability	N	n	SD	Df	T	Sig.	Decision
High	38	29.9737	6.39885	55	0.382	.704	Not Significant
Low	19	29.2105	8.39695				

Table 6 showed $t(0.382) < P(0.704)$ which is not significant difference. Hence, HO₃ is accepted. Therefore, there is no significant difference in the mean retention scores between high and low ability students using TTA.

DISCUSSION OF RESULTS

The essence of instruction is to improve achievement and increase retention learned concepts. The results showed a difference in achievement between high and low ability students taught using lecture method. In determining whether the difference was significant, independent t test analysis showed $t(9,776) > P(0.000)$. Hence, HO₁ is rejected. Therefore, there is a difference in the mean achievement scores between high and low ability level students using lecture method. Also, research question two showed a difference between high and low ability students taught using TTA in favour of high ability students. However, t-test showed the difference is not significant with $t(0.344) < P(0.732)$. Hypothesis two was accepted. Therefore, there is no significant difference in the mean achievement scores between high and low ability level students using TTA. This result is in consonance with Adodo and Agbayewa (2011), Adesoji (2008), Hemmati & Sadeghi, (2015) who found a no significant difference between ability levels when taught with TTA.

Lastly, research question 3 showed a difference in the retention scores of students in Chemistry between

students of high ability level and those of low ability level using Target Task Approach (TTA). Also, the independent sample t-test analysis a no significant difference with $t(0.382) < P(0.704)$. Hence hypothesis 3 was accepted. Therefore, there is no significant difference in mean retention scores in Chemistry between students of high ability level and those of low ability level using Target Task Approach (TTA).

CONCLUSION

Based on the results of the study, the following conclusions were made:

1. Target task approach is effective in bridging the ability gap of learners learning outcome effectively when compared with lecture method. This may be due to the effectiveness of the method engaging every participant.
2. Target task approach is bridge the retention rate of low and high ability level students. This shows the method will enable students excel more in external exams.

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