Effects of Problem Solving Strategy on Retention in Reading Comprehension

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ABSTRACT

The study investigated the effects of problem solving strategy on Retention in Reading Comprehension when compared to a control group taught with read-re-read approach. The design of the Study was a quasi- non randomized Pre-test, posttest control group design. The population of the Study was 6001 SS1 students while the sample were 179 students from two coeducation secondary schools purposively selected for the Study. Experimental group had 83 students while the control group had 96 students all in their intact classes. The instrument for data collection was a reading Comprehension Achievement Test which was duly validated by experts. The reliability was established using kuder Richardson formula (KR 20) and it was 0.81.one research question and one Hypothesis guided the Study. Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the Hypothesis at 0.05 level of significance. The study revealed that there was a significant difference in the retention of students taught reading comprehension with problem-solving strategy and that of those taught same contents with the conventional read, reread method. One of the recommendations was that teachers should use problem solving strategy method in teaching students in order to help them learn better and to retain learnt contents.

KEYWORDS: Problem Solving, Strategy, Retention, Reading Comprehension

Introduction

The poor performance of students in examinations has been a source of worries to lovers of education and progressive thinkers on what to do to ameliorate the challenges of poor academic achievements of students. The exam tensions and anxiety students' exhibit during examination periods are also worrisome to many psychologists as to find a lasting solution to these anomalies. The worry hubs on the fact that the students attend lectures yet they dread test, examination and others to pass, some tend to cheat, could it be that the method of teaching students to read comprehension has not been able to help the students to assimilate the contents into their memory. It appears that teachers have not been able to bring out the best from the students as many students appear not to have learnt the contents meaningfully, perhaps due to the absence of requisite learning skills that would enable them process information well, think critically and take complete charge of their learning. As a result, many do resort to rote learning as they cram to pass examinationon. In this case, the learned materials are not retained; hence many students not only perform poorly in the prescribed exams that follow termly, yearly and even in the external examinations, but more unfortunately, they soon forget virtually all that they have learnt. The reason is the fact that the materials were not meaningfully learned and stored in the memory. These things happen probably due to the fact that students lack robust

metacognition (self-regulated) learning skills that are critical for effective encoding of information in the memory which leads to retention of learnt materials. This is due to the fact that teachers use predominantly conventional, read, re-read questions and answers method in teaching reading comprehension in English language that tends to promote rote memorisation instead of helping students acquire critical learning skills that are pivotal for effective anchoring of learnt materials in the memory system.

Ohia and Ochuba (2015) found that the prominent factor in the trend of student's poor achievements in English language is their inability to read, let alone comprehend and retain simple English language passages. They affirmed that comprehension and Retention of learnt materials is one of the most fundamental objectives of the school system. Students must read and comprehend and retain information for effective utilisation. The poor achievements of students in English language could be due to lack of innovative teaching skills and poor responsive in the attitudinal change among students towards the learning of English language, as this calls for a concerted search for the use of innovative teaching strategies that could help learners develop self-regulatory learning skills, which will obviate student's difficulties in understanding the language and improving achievements in English language. It is not enough only to learn to pass examination but to use the knowledge and the skills acquired from school to solve problems within and out of school. It therefore becomes imperative, that strategies that will help the learners develop critical thinking skills of deep processing of information, and retaining of learnt materials be used in teaching reading comprehension to students. One of the outcome of education is to raise life-long learners, individuals who would use the skills acquired while in school to solve their personal problems and problems of others, even when they are out of school (Ahangar, 2010). This can only be achieved effectively through the use of Pedagogical teaching strategies, such as problem solving strategy which helps learners to take personal actions to solve their learning problems, focus on thinking as vital elements and use real life experiences to acquire knowledge in meaningful real life activities, thus working at higher level of thinking. Developing critical thinking skills through deep processing of information to retain and apply acquired knowledge is one of the functions of education in this 21st century where it is impossible for every country to provide jobs for all the teeming population of graduands reel out from the universities yearly. Equipping the learners to face life challenges is one of the goals of education which problem solving strategy has been shown to be effective in enabling students to acquire metacognitive learning skills that equip students to comprehend better and to retain information for future use.

Polya, (2007) identified techniques that could be used in problem solving strategy to include; self-regulated, critical thinking, brainstorming, reflection morphological analysis, intelligent guesses, synthesis and collaboration. He asserted that students are more likely to develop confidence, relay on their own resources for completing assignments, study to achieve success in school, if they are made to acquire at least few of those skills. Problem solving strategy is a four step group method of teaching students reading comprehension. It is a type of collaborative learning which allows students of different learning abilities to work together to achieve their desired goal. This helps to place the learners at the centre of the learning wheel, as there are mixed abilities whereby the learners are made to take full charge of their learning experiences, initiate, participate and personally make direct efforts to acquire knowledge rather than rely solely on their teachers to learn. The inability of students to learn and to retain in the memory what they learned makes them to perform poorly in examinations. In this case, if

nothing is done on time to remedy the situation, there could be decreased in school enrolment as a result of persistent failure.

Reading comprehension is an intentional, active and interactive process that occurs before, during and after a person reads a particular piece of writing. It involves reading, understanding deeply, retaining and being able to recall learned materials when needed. Reading a text without understanding means mere tracking the symbols on the pages without making meaning out of the read materials. It is therefore important to use a strategy that would help the learners critically process, understand texts, retain information in the memory and be able to recall the main idea when needed. If there is no understanding of a read text and without making a link with the reader's previous knowledge, the learner might not be able to properly store the information for future use. This means that there is need to retain learned materials for future use, as information properly stored is information quickly recalled when the need for such information arises.

Retention is the persistence of learnt materials over a long period of time, which can be reflected in the individual's ability to recall or remember what has been learn. It is having the information properly stored in the memory to be recalled when needed (Nkwocha 2004). Retention involves over learning, over mastery, constant practice, talking and sharing of what is read to one another. Retention is a conscious encoding of information in the memory. A deliberate and meaningful logging in of information in the brain ensuring no fading of contents learnt. The duration of retention depends upon the strength and quality of the memory traces either short or long time memory. For information to be retained in the memory depends on how such information is processed and stored. Information for which active and conscious efforts were made to store in the memory are remembered better and recalled faster than information that was not appropriately and adequately processed. Inability of a learner to process and retain information is one of the situations that problem solving strategy can be used to address. The situation whereby students learn and do well in achievements tests, but forget as soon as the test is over, is rampant among students and something needs to be done about this ugly situation. Students who merely focus on memorisation of subject contents with the aim of regurgitating them in examinations to obtain good grades rather than on diligent efforts to acquire competencies and thinking that would enable them apply learnt materials in life situations for personal and societal advancement. The world today is a global village and without adequate possession of relevant thinking and problem solving skills on graduation, the chances are that the individual remains a perpetual job seeker. Therefore, to help prepare learners adequately for challenges of today's environment, where they must of necessity be innovative and creative in applying knowledge they acquired in schools, it then requires that teachers use instructional strategies that impacts on students thinking skills and memory such as problem solving strategy. Information-processing theory of learning and memory (Anderson and Ashcraft developed 1970) described the processing, storage and retrieval of knowledge in the mind. According to this theory, sensory registers which is component of the memory system in which information is received and held for a very short period of time, receive large amounts of information, from sense organs and holds it for a short period of time. This information that was received if not used is rapidly lost. In this case for an individual to retain information received, he must pay attention to the needed information (focus). Again, time will be given to bring all the information seen in a moment into consciousness. The information which the individual gives a perceived attention is then transferred to the short term memory which holds the information for a few

seconds, and then stored as long as the information is being thought of in the mind. Through thinking about the information or by talking about it, information is transferred from the working memory to long term memory where information is kept for a long period of time (Ebenebe, 1995).

According to Slavin (2009), long term memory was divided into three parts; episodic memory, semantic memory and procedural memory. The semantic memory contains general world knowledge that has been accumulated over a long period of time. It contains facts, ideas, meanings and concepts which are intertwined one's experiences but dependent on culture. Semantic memory performs three major tasks encoding which involves converting information into a form that can be entered into the memory, the second function is the storage, that is retaining of information and the third task is the retrieval which involves locating and accessing specific information when it is needed.

Slavin (2009) Cole (1998) and Elis (1994) believe that people retain a large proportion of what they learn in school. To them, long term retention of information that is learned in school varies a great deal according to the types of information. Concepts are retained much longer than names, and retention drops rapidly in the first few weeks after instruction but then levels off. Whatever students have retained about 12 to 24 weeks after instruction, they may retain forever.

Paivios dual code theory of memory agrees with semantic memory that information is retained in long term memory in two forms; the visual and verbal forms. As the theory hypothesizes that information repeated both visually and verbally is recalled better than information represented only in one way.

Another important model of retention called levels-of-processing theory by (Craik & Tulvin, 2000) holds that people subject stimuli to different levels of mental processing and retain only the information that has been subjected to the most thorough processing. It then means that for information to be retained, it must undergo levels of mental processes which enables it to be permanently stored in the long term memory. These levels of processes it has to go through is what Eziefula (2014) opined as factors that facilitate retention which include;

Practice (ii) Repetition (iii) Formative evaluation (iv) Use of mnemonics and over-learning.

Practice: This has to do with putting into action in form of practicing what has been taught in school. Practice aids for better understanding of a learned material and also helps in retaining through proper encoding of what has been learnt, Nkwocha (2004) identified two types of practice for retention, the spaced and massed practice. The spaced method of practice helps the students to retain more in that it helps students to establish deep familiarity with the learned materials and can retrieve it effortlessly when needed. The massed practice do not help students to retain, for the single reason that it is done in a haste just to pass examination and the knowledge is quickly lost after examination. So, students have to be given assignments and projects on what has been taught to enable them practice learned materials at home. Distributed practice helps the learner to retain through integrating information in long term memory.

Repetition: This is somehow related to practice but it differs, it needs a conscious thinking about an information received and talking about it in the mind loud enough, the information is retained in the working memory, in this case, student's attention are to be drawn to important information

during teaching and they are to repeat the important information they received in order to retain learned material.

Over-learning: This is another important method for gaining mastery and retaining learned materials. It is a continuous studying or practicing of learned material after initial proficiency has been achieved so as to reinforce or ingrain the learned material or skill. It is a repetitive study that aids retention over learning is important because it gives the learner the repeated chances to link memory with other ideas because, memory fades overtime, so recall is easier through over learning or over training.

Mnemonics is an important device that aids retention. It is a kind of linking words, accordingly to facilitate retention. The students can use initials of keywords in the content learnt in the class and form a word that can help them remember what has been taught.

Office of Educational Enhancement gave ten important strategies for improving retention and retrieval of learned materials.

I.   Focus attention

    a.   Introduce lecture with short outline or summary

    b.   Describe the gap in knowledge/understanding what you are trying to fill

    c.   Increase curiosity by starting with a controversy, challenge, and case, example (the "hook" or "lead"

    d.   Use an image, video, etc to capture attention

    e.   Start with a personal story or struggle to personalize and capture attention

    f.   Use humour, but ideally the concept to be understood should be the focus of the joke

2.   Promote practice at retrieval

    a.   Ask questions periodically to check understanding

    b.   Ask why students chose their answer

    c.   Return to key concepts at several points in the lecture or course

    d.   Relate material to previously covered concepts, previous lectures or courses

    e.   Point out connections between concepts and other materials, applications

    f.   Provide cues for recall, with examples, context, or mnemonics

    g.   Space out quizzes, tests for optimal long term retention

    h.   Send email "quizzes" and ask for the answer at the next class

3.   Require learners to take information presented in one format and re-represent it in another format

a. Consider providing skeletal outlines or diagrams of the lecture for students to fill in on their own at times

b. Ask students to rephrase a concept or to explain it to each other

c. Create tables or charts for students to fill in – to categorize or make contrasts between key concepts

d. Ask students to predict an outcome or diagnosis

e. Ask students to write a test question about what they perceive as an important concept

f. Ask students to compare or contrast concepts

g. Ask students to think of a real world application of a concept

h. Consider role playing scenarios to probe understanding

4. Vary conditions under which learning takes place

a. Change the format of class time periodically

b. Use different methods during laboratory times

c. Use computer based instructional methods or for assignments and "field trips"

d. Point out relevant clinical cases in the hospital if possible

e. V. Recognize underlying assumptions and prior knowledge and experience ("right" or "wrong")

f. Use pre-surveys or pre-tests

g. Ask for predictions or "guessing" to learn about prior assumptions

h. Ask students to make lists regarding an upcoming topic

5. What students recall soon after learning influences what they learn later

a Provide self-assessment quizzes

b Ask for a one-sentence or one-minute summary of a concept

c Ask about the key concepts from the previous lecture material at the beginning of the next class

d Provide a brief summary of key points at the end of class (or create with students)

e VII. Remember less is more for long term retention and transfer

f Reassess your core goals for the class

g Have a clear plan for each lecture, lab period, etc.

h   Slow down during lecture for better processing

i   Use strategic enthusiasm on key points

j   Allow yourself time to go back to key concepts

6.   Create "doing" activities (ideally to do at midpoint of lecture)

a   Case exercises

b   Dissection

c   Writing exercises

d   Charts or diagrams to fill in

e   Demonstration or debates

7.   Integrate material with prior experience, future context

a   Learn what is taught in prerequisite courses

b   Provide examples of applications (cases, surgical procedures, research investigations, public health problems, herd problems)

c   Use analogies and metaphors

d   Use selected extreme examples to make a point

8.   Promote self-assessment of knowledge learned

a   Self-quizzes

b   Study questions

c   Computer based assignments and

d   Other classroom assessment techniques.

One of the goals of education is to empower the learner with necessary tools to use within and out of school. Both the contents in the teaching subject and the skills adopted in teaching and learning should help the learner remember what he/she learn. Ash craft (1970) saw retention as a mental processing of information which is internally and externally motivated.

Eziefula (2014) averred that if learned materials should be retained, teaching-learning strategies should be well organized and appropriate skills should be used in teaching students. Interest and attention are important factors in retention. Retention is a conscious as well as unconscious effort, concepts are retained much longer than names and retention drops rapidly in the first few weeks after instruction but then levels off. Whatever students have retained about 12 to 24 weeks after instruction, they may retain forever (Slavin, 2009; Cole, 1998; Ellis, 1994). Eziefula (2014) discussed factors that facilitate retention. They are: meaningfulness of material, practice, repetition, formative evaluation; use of Mnemonics and over learning.

In order to help the students imbibe the metacognitive skills that would help them learn better and retain what learnt in school, Polya's (2007) four steps in removing obstacles in reading comprehension in which students acquire knowledge and skills that help them move from level of not knowing how to solve reading comprehension problem to knowing how to solve problems and retain studied contents is used and the steps are: (1) Identification/understanding the problem through asking self-regulated questions ('why'- questions) which would help them to understand what to do with given comprehension passages. This helps the learners to have deeper understanding of the problems in the reading tasks. The second step is to devise a plan in form of scheming out critical thinking skills to use in solving the identified problems. The third step is carrying out the plan. This is the implementation stage, whereby the students use the comprehension skills to read the passage in order to remove the identified obstacles. The fourth step which is the last stage is the look back stage, whereby the problem solver does personal assessment to ascertain whether the problem so identified has been solved. The easiest way to ensure this is by drawing a sketch of mental representation of the passage read using mind map. It is on this that the work seeks to investigate on the effects of problem solving strategy on Retention of students in Reading Comprehension of Secondary school students.

One research question and one Hypothesis guided the Study, thus:

What are the mean retention scores of students taught reading comprehension with problem-solving strategy and of those taught with conventional read, re-read method?

There is no significant difference in the mean retention scores of students taught with problem-solving strategy and those taught with conventional read and reread method.

Method

The study was a quasi-experimental that adopted a non-randomized pre-test post-test control group design. The Study was conducted using Orlu education Zone 1 of Imo State. The population was made up of 6001 students both males and females. The sample size was 179 students in the intact classes. 83 in experimental class,95 students in control group. Purposive sampling technique was used to select two co- educational schools in the area. An instrument (RCAT) was used to collect the data for the study. The instrument was validated and tested for reliability using Kuder Richardson (KR 20) formula which gave 0. 81.Mean and standard deviation were used to answer the research question while the hypothesis was tested using Analysis of Covariance(ANCOVA)at 0.05 level of significance.

Result:

Table 1: Post-test and Retention Post-test Mean Scores of Students Taught Reading Comprehension with Problem-Solving Strategy and that of those taught with Conventional Method.

Source of Variation	N	Post-test X	SD	Delayed Post-test X	SD	Lost X	Remarks
Experimental Group	83	62.72	9.20	56.11	9.35	2.39	Effective
Control Group	96	44.20	6.57	34.35	7.99	9.85	

Table 1; indicates that experimental group had posttest mean score of 62.72 and retention post-test mean of 56.11 with lost mean score of 2.39, while the control group had posttest mean of

44.20 and retention post-test mean score 34.35 with lost mean of 9.85. With lesser lost mean of 2.39, problem-solving strategy is effective in retaining students' achievement in reading comprehension.

Table 2: ANCOVA on Posttest and Retention Posttest Mean Achievement Scores of Students taught Reading Comprehension with Problem Solving Strategy and Those Taught with Conventional Method

Source of Variation	Sum of Square	df	Mean Square	Cal. F	P-value	Remark
Corrected Model	26319.691	2	13159.846			
Intercept	261.191	1	261.191			
Posttest	5253.540	1	5253.540			
Methods	1498.796	1	1498.796	32.996	0.000	S
Error	7994.443	176	45.423			
Total	387845.000	179				
Corrected Total	34314.134	178				

Table 2 indicates that at 0.05 level of significance 1df numerator and 178df denominator, the calculated F 33.00 with P value 0.000 which is less than 0.05, the null hypothesis is rejected. Therefore, there is significant difference in the posttest and Retention posttest mean Achievement scores of students taught Reading Comprehension with Problem Solving Strategy and those taught with Conventional method.

Discussion of Findings

The findings showed that difference exists between the mean retention score of experimental group taught with problem solving strategy and that of those in control group who were taught with read and reread method with the mean of 56.11 from the experimental group against 34.35 of the control group, with a lost mean of 9.85 which is very high compared to the mean lost of 2.39 of the experimental group. From the above result, it was observed that the students in the experimental group retained better what they were taught than the control group who did not retain as much as the experimental group. The possible reason for this could be the sharing of their real life experiences connecting it to the content they read in the class helped them made an emotional connection to the things being learned. Again talking and repeating to one another what they learnt in small groups and by drawing a map to capture what learnt in a nut shell also helped to anchor what they learnt in their long term memory. It could also mean that the four problem solving steps identifying, devise, carry out plans, and look back processes also helped the students to deeply process what they learned and was able to retain the learnt information after three months. The students in control group of read reread class could not retain much of what they learnt may be the method couldn't help them to properly process information and to log into long term memory information left at short term memory do not last for long period of time. information in the long term memory is permanent and can be retrieved easily. Information properly stored is information easily recalled. No wonder the retention rate is high in the problem solving class as against the conventional read and reread group who only read the same passages severally with the help of their teacher; the students were not made to be active during the reading as such they were not able to retain much and they could not recall much of what they

learnt. Also this finding is consistent to the study of Hussain, Nafee, and Jumai (2009) that problem based instruction which follows a systematic step in seeking solution to problems is efficient and helps in retentive ability of learners. This finding is in agreement with an earlier finding of Ormrod (2008), Palinscar and Brown (1989) and Eziefula (2014) that learning methods that are meta cognitively sophisticated and which make students work together to regulate their learning tasks helps them to learn better and retain learned materials. Again, this agrees to Okwara-kalu (2012) and Miriogu (2016) that method which involves the students more in learning experiences where the students do more of talking in the learning wheel help the students retain what is learnt due to full active participation in the learning than students taught with inactive method that make the teacher to dominate and do more of talking during teaching and learning. Studies by Odini (2010), Nwosu (2017) noted that conventional method of teaching reading comprehension with reread method whereby the teacher parrots and dominates the teaching and learning experiences does not help the learner make use of learnt experiences out of school.

Conclusion

The result of this finding shows that problem solving strategy is much more superior to Read Re-read method in teaching students reading comprehension. The students in experimental group taught with problem-solving Strategy retained greater what they learnt than students in the control group taught with Read Re-read method who lost much of what they learnt.

Recommendations

1. Teachers should use problem solving strategy method in teaching students in order to help them learn better and to retain learnt contents.

2. Workshops and seminars should be organised and sponsored by the government to train and retrain teachers on the Pedagogical skills of problem solving strategy to enable them to raise life-long learners.

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