



## Effect Of Science-Text-Cards on Students' Gender-Based Interest In Science At Upper Basic Schools In Makurdi, Nigeria

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| Article Info  | ABSTRACT  |
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| <p><b>Received:</b> 20-01-2025<br/><b>Revised:</b> 22-05-2025<br/><b>Accepted:</b> 07-07-2025</p> <p><b>Geoffrey Aondolumun AYUA</b><br/><a href="mailto:gayua@bsum.edu.ng">gayua@bsum.edu.ng</a></p> | <p>The effect of Science-Text-Cards (STC) on students' gender-based interest in science at upper basic schools in Makurdi, Nigeria was studied using a pre-test-post-test quasi experimental research design. A multistage sample of 56 out of the 2007 upper basic two students in the 29 Schools in Makurdi was used for the study. The instrument used for data collection was Interest Level in Basic Science Concepts Questionnaire (ILBSCQ). It was validated by experts in science education from Benue State University, Makurdi. A reliability value of 0.94 determined by a split-half method and Cronbach Alpha was used. The research questions were answered using descriptive statistics of mean and standard deviation while inferential statistic of Analysis of Covariance was used to test the hypotheses at 0.05 level of significance. Findings revealed a significant difference in the interest level between students taught Basic Science using STC and those taught using Recitation Teaching Method, <math>F(1, 53) = 28.088, p(0.000) &lt; 0.05</math>. Also, there was no significance difference in the interest level of students based on gender, <math>F(1, 28) = 2.721, p(0.110) &gt; 0.05</math>. It was therefore concluded that Science-Text-Cards (STC) enhances and sustains the interest level of students in Basic Science better than Recitation Teaching Method (RTM). Not only that but also STC is gender friendly.</p> <p><b>Keywords:</b><br/>Basic Science, Gender, Interest, Recitation Teaching, Science-Text-Cards.</p> |

### INTRODUCTION

Science is known as the knowledge obtained by observation and testing of facts. It can also be referred to as the knowledge about the structure and behaviour of the natural and physical world based on facts that can be proven such as an experiment. It can also be defined as the systematic process of making enquiry about the living and non-living things in our environment. The study of living and non-living things is a topic that is taught in Basic science.

Basic science is a course taught at the Basic level in schools; it exposes the students to the knowledge of science. Some students that find Basic science interesting get inspired to choose a career in sciences. Since it is a fundamental science course, it is the responsibility of the teacher to carry the students along in order to reduce the level of abstraction.

Basic Science is a preliminary and a core subject at the upper 9-year Universal Basic Education (UBE) level in the Nigerian education system. Basic Science integrates all the different specialised areas in the scientific enterprise in order to make learners have a holistic view of science subjects. The knowledge of Basic Science is necessary for individual to be scientifically trained in different areas of endeavour (Oniya & Adefila, 2020). It also helps in the development of the nation scientifically and technologically. The subject was introduced into the Nigerian secondary schools as a panacea for some of the problems bedevilling science education especially at the upper basic school level. The programme

as stated in national policy on education (Federal Republic of Nigeria-FRN, 2014) emphasizes acquisition of skills and development of the spirit of enquiry as opposed to rote learning. It has been observed by Omebe and Omiko (2015) that the suggested methods of teaching Basic Science have been utilized for several years by the Basic Science teachers and yet students' interest in the subject has not been encouraging.

Interest refers to the feeling or emotion that makes students focus their attention on concepts in Basic Science. Interest is commonly considered as a motivational construct that directs an individual's attention and drives activities related to specific objects, stimuli, and events. Interest-driven activities are typically accompanied by positive emotions and increased cognitive functioning (Renninger & Hidi, 2016). Students' interest in Basic Science according to Ayua and Eriba (2014), refers to the feeling, curiosity, willingness, or persuasion of children wanting to know about science and their longing and readiness to be actively involved in its learning, principles and practice. Danjuma (2015) states that interest is an important aspect in the learning process. This is because it helps in sustaining concentration, purpose, commitment and cooperation with the teacher in the teaching and learning processes. Interest is an important variable in learning, because if the learners are interested in learning Basic Science concepts, they will be more actively involved in the learning process. According to Oviawe and Adeola (2017) interest is a pre-indication of attention, once there is direct interest, attention is guaranteed and learning is assured. Also, Essiene et al. (2015), reported that interest most often is directly tied to the content or instruction, and it also directs and enhances learning. This means that students' interest in Basic Science could likely have the potential of positively affecting their academic performance in the subject. This could imply that, a higher interest in Basic science would yield a corresponding higher academic performance in the subject as well as in further science studies at the post-basic education level. However, this can hardly be achieved if Basic Science content or subject matter is taught using teacher-centred methods, which predisposes students to passive learners, makes the concepts meaningless, tiresome and uninteresting (Ayua & Ode, 2015; Ayua et al., 2021). This underscores the need to employ the constructivists' instructional strategies in presenting Basic Science lessons especially to the formative-age learners in basic schools.

Science-Text-Cards (STC) is an innovative teaching method to convey the science facts in an easy and organized way. This strategy involves the use of carefully designed cards that contain concise scientific explanations and visuals. According to Carrier (2015), STC serve as a valuable educational tool for promoting engagement, understanding, and critical thinking skills in science classrooms. The visual and concise nature of STC captures students' attention and motivates them to explore scientific concepts further. The strategic use of specific scientific terminologies in the text cards helps students build their vocabulary around scientific concepts and frequent exposure to these terms enhances content retention, allowing students to remember critical information and apply it in various scientific contexts (Melvin, 2019). The use of innovative teaching strategies like Science-Text-Cards may help reduce the abstraction of science concepts which discourages learning by recitation.

Recitation Teaching Method (RTM) is a teacher-centred instructional strategy in which the teacher or student reading of question from the text and the students recite answers which they find in the textbook or have memorized (Hasibuan, 2022). Recitation involves rote answers and repetition of answers from the text which leads to students' lack of interest in the classroom. According to Nurhayati (2016), Recitation Teaching Method is a structured instructional approach where students are expected to memorize and recite information or content. This traditional approach also insists that all the students should memorize the same materials at the same point, students that cannot memorize quickly enough are punished, rather than being allowed to succeed at their natural speeds. Recitation Teaching Method makes students cram the materials instead of understanding and most at times the students tend to forget the content of the material once through with the class lesson.

Gender is a co-variable in this study. It refers to the state of being male or female, man or woman, boy or girl. Gender disparity according to Danjuma (2015), globally militates against equitable participation of boys and girls in Science Education especially in Africa. Ali, Ozovehe and Dyaji, (2014), submitted that females face a number of inequitable difficulties that limit their potentials in participation in the Sciences. This shows that gender peculiarities affect students' interest in the teaching and learning of Basic Science concepts. Students interest in Basic Science is gender related. For instance, Wakili (2018); Godpower-Echie and Owo (2019) found that boys were more interested in Basic Science than the girls. However, Danjuma (2015) and Shaibu (2016) found no gender disparity among students' interest in Basic Science.

Under normal circumstances, neither teachers nor students aim at low interest in the teaching and learning of Basic Science. Yet one thing or the other brings about students' low interest in Basic Science. According to Itodo (2019) students learning process is initially based on teachers teaching. Without teachers' scientific and effective instruction, students may hardly possess interest in certain knowledge. In the same vein, Adam (2013) asserts that the declining interest of students in Basic Science is attributed to the uninteresting manner in which the content is presented to the learners and some difficult content of Basic Science courses. Sambo et al. (2014) blamed the lack of students' interest in Basic Science on poor teaching method employed by most teachers. The use of Teacher-Centred method of instruction including Recitation Teaching Method has brought about students lack of interest in Basic Science.

The poor level of students' interest in Basic Science has affected the enrolment rate of students into sciences at post-basic and tertiary level of schools in Nigeria. Between 2014 and 2019 the enrolment rate of students into sciences has dropped from 21.92% to 13% (Ayua, 2020). If this change is left untreated, it may lead to disparity in the national development and future visions for science education in Nigeria. It on this premise that the effect of Science-Text-Cards on students' gender-based interest in science at upper basic schools in Makurdi, Nigeria was studied. The following are the specific objectives of this study:

1. To ascertain the interest level of students taught Basic Science using Science-Text-Cards (STC) and those taught using Recitation Teaching Method (RTM).
2. To determine the interest level of students taught Basic Science using Science-Text-Cards (STC) based on gender.

## METHODS

A pre-test post-test quasi-experimental - control group research design was used for the study. The population of the study comprised 2,007 Upper Basic two students in 29 Universal Basic Education in Makurdi, Benue State. A sample of 56 Upper Basic two students in 2 UBE Junior Secondary School in Makurdi Metropolis was employed. The Experimental Group comprise of 31 (15 male & 16 female) students while the control group consist of 25 (10 male & 15 female) students. The sample was drawn by multistage (including stratified, purposive and random sampling) sampling technique. The researchers employed purposive sampling to select 2 schools out of the 29 UBE Junior Secondary Schools. The two schools were assigned to experimental group and control group respectively. The researchers employed simple random sampling to select two intact classes for experimental group and control group.

The instrument for data collection was Interest Level in Basic Science Concepts Questionnaire (ILBSCQ). The instrument (ILBSCQ) was constructed by the researchers. It was face and content validated by three experts in science education. To determine the reliability coefficient of ILBSCQ, a trial test was conducted on 20 students who are part of the population but are not part of the sample for the study using Split-half method; the data generated was analysed using Cronbach Alpha yielding a reliability index of 0.94.

Pre-test was given to both groups so as to determine the interest level of Students in Basic Science. After pre-test administration, both groups were taught the concept of work, energy and power using Science-Text-Cards (STC) for Experimental Group and Recitation Method (RM) for Control group. Lesson plans for both groups were guided by the 9-year basic education curriculum and upper Basic two Text book. In the experimental group, the teacher facilitated the lessons and for each treatment lesson lasted for 80 minutes. The lessons were planned to capture and maintain students' interest and also to involve them in the class teaching and learning activities. The teacher supplied the students with Text cards based on the topics (work, energy and power), and on each card, the concepts were pin-pointed for the students to study in groups and discuss amongst themselves their understanding on the topic and thereafter a total class discussion facilitated by the teacher. This treatment lasted for four weeks before post-test. The collated data was analysed to ascertain the interest level of Upper Basic Science students. The research questions were answered using mean and standard deviation while Analysis of Covariance (ANCOVA) was used to test the null hypothesis at  $P \leq 0.05$  level of significance.

**RESULTS AND DISCUSSION**

The data generated were analysed using mean, standard deviation, and Analysis of Covariance (ANCOVA) and summary of the results were presented in order of the research questions and hypotheses as follows:

Research Question One is what is the difference between the interest level of students taught Basic Science using Science-Text-Card and those taught using Recitation Teaching Method (RTM). Result in Table 1 shows similarity in the pre-interest level among students taught Basic Science using Science-Text-Card and those taught Basic Science using Recitation Method with means of 48.45 and 47.24 in the pre-interest and the table shows means of 60.00 and 50.60 in the post-interest respectively. The Table also shows that all the interest scores of students taught Basic Science using Science-Text-Card (STC) were higher than those taught using Recitation Teaching Method (RTM) with a wide mean gain difference of 8.19.

**Table 1: Mean and Standard deviations of students' interest level in experimental and control groups**

| Teaching Method            | Sample (n) | Pre-I     |        | Post- I   |        | $\bar{x}$ Gain | $\bar{x}$ Gain Difference |
|----------------------------|------------|-----------|--------|-----------|--------|----------------|---------------------------|
|                            |            | $\bar{x}$ | SD     | $\bar{x}$ | SD     |                |                           |
| Science-Text-Card          | 31         | 48.45     | 10.698 | 60.00     | 0.000  | 11.55          | 8.19                      |
| Recitation Teaching Method | 25         | 47.24     | 11.526 | 50.60     | 12.602 | 3.36           |                           |

$\bar{x}$  (Mean), SD (Standard Deviation), I (Interest)

Research Question Two is What is the difference between the interest level of students taught Basic Science using Science-Text-Card based on gender. The results in Table 2 displays a comparison in the pre-interest level between male and female students taught Basic Science using Science-Text-Cards (STC) with means of 48.20 and 50.56 in the pre-interest and the table shows means of 56.47 and 56.94 in the post-interest respectively with a negligible mean gain difference of 1.89.

**Table 2: Mean and Standard deviations of male and female students' interest level in experimental group**

| Gender | Sample (n) | Pre-I     |        | Post- I   |       | $\bar{x}$ Gain | $\bar{x}$ Gain Difference |
|--------|------------|-----------|--------|-----------|-------|----------------|---------------------------|
|        |            | $\bar{x}$ | SD     | $\bar{x}$ | SD    |                |                           |
| Male   | 15         | 48.20     | 11.047 | 56.47     | 1.457 | 8.27           | 1.89                      |
| Female | 16         | 50.56     | 8.532  | 56.94     | 8.721 | 6.38           |                           |

$\bar{x}$  (Mean), SD (Standard Deviation), I (Interest)

Hypotheses One: There is no significant difference between the interest level of students taught Basic Science using Science-Text-Cards (STC) and those taught using Recitation Teaching Method (RTM)

According to the result in Table 3, there is a significant difference in the interest level between students taught Basic Science using Science-Text-Cards (STC) and those taught using Recitation Teaching Method (RTM),  $F(1, 53) = 28.088$ ,  $p(0.000) < 0.05$ . The null hypothesis which state that there is no significant difference between the interest level of students taught Basic Science using Science-Text-Cards (STC) and those taught using Recitation Teaching Method (RTM) was therefore rejected. This implies that Science-Text-Cards (STC) significantly enhances the interest of students in Basic Science better than Recitation Teaching Method (RTM).

**Table 3: Summary of ANCOVA Analysis on interest level between experimental and control groups**

| Source          | Type III Sum of Squares | Df | Mean Square | F      | Sig. | Partial Eta Squared |
|-----------------|-------------------------|----|-------------|--------|------|---------------------|
| Corrected Model | 3034.182 <sup>a</sup>   | 2  | 1517.091    | 40.190 | .000 | .603                |
| Intercept       | 2520.095                | 1  | 2520.095    | 66.761 | .000 | .557                |
| Pretest         | 1811.342                | 1  | 1811.342    | 47.985 | .000 | .475                |

| Source          | Type III Sum of Squares | Df | Mean Square | F      | Sig. | Partial Eta Squared |
|-----------------|-------------------------|----|-------------|--------|------|---------------------|
| Teaching Method | 1060.277                | 1  | 1060.277    | 28.088 | .000 | .346                |
| Error           | 2000.658                | 53 | 37.748      |        |      |                     |
| Total           | 179421.000              | 56 |             |        |      |                     |
| Corrected Total | 5034.839                | 55 |             |        |      |                     |

a. R Squared = .603 (Adjusted R Squared = .588)

Hypotheses Two: There is no significant difference between the interest level of students taught Basic Science using Science-Text-Cards (STC) based on gender?

From the result in Table 4, there is no significant difference in the interest level between male and female students taught Basic Science using Science-Text-Cards (STC),  $F(1, 28) = 2.721, p(0.110) > 0.05$ . The null hypothesis which state that there is no significant difference between the interest level of students taught Basic Science using Science-Text-Cards (STC) based on gender was therefore not rejected. This implies that Science-Text-Cards (STC) improves interest of male and female students in Basic Science without gender disparity.

**Table 4: Summary of ANCOVA Analysis on interest level based on gender**

| Source          | Type III Sum of Squares | Df | Mean Square | F      | Sig. | Partial Eta Squared |
|-----------------|-------------------------|----|-------------|--------|------|---------------------|
| Corrected Model | 358.486 <sup>a</sup>    | 2  | 179.243     | 5.824  | .008 | .294                |
| Intercept       | 1934.711                | 1  | 1934.711    | 62.866 | .000 | .692                |
| Pretest         | 308.964                 | 1  | 308.964     | 10.039 | .004 | .264                |
| Gender          | 83.729                  | 1  | 83.729      | 2.721  | .110 | .089                |
| Error           | 861.707                 | 28 | 30.775      |        |      |                     |
| Total           | 106085.000              | 31 |             |        |      |                     |
| Corrected Total | 1220.194                | 30 |             |        |      |                     |

a. R Squared = .294 (Adjusted R Squared = .243)

The finding reveals a significant difference in the interest level of students taught Basic Science using Science-Text-Cards and those taught using Recitation Teaching Method. The finding is in favour of those taught using Science-Text-Cards. This is because during the teaching and learning process using STC, the students were given tasks to perform in groups based on the text-cards provided with information of concepts on each cards following class demonstration, discussion and interaction. This finding agrees with that of Ayua et al. (2021), who found a significant difference in the interest level among varied-ability of students taught Basic Science using creative-Teaching and those taught using Lecture Method in favour of creative- Teaching. This finding also agrees with that of Tofi et al. (2017), Hasni and Potvin (2015), Okechukwu (2021), and Obodo et al. (2021) who found a significant difference in the interest level of students taught Basic Science using a Student-centred method and those taught using Teacher-centred method. This implies that STC as a Student- centred approach is effective in increasing the interest level of students in Basic Science.

Again, the finding reveals that there is no significant difference in the mean interest level between male and female taught Basic Science using Science-Text-Cards. This finding is similar to Usman et al. (2022). Ayua et al. (2021), and Sunday and Godpower (2023), who found no significant difference between male and female students taught Basic Science using Student-centred methods. However, this finding differs from that of Tofi et al. (2017), who found a significant difference in the interest level of students taught Basic Science using a student-centred method, this difference might occur due to time, the teaching method used and the location of the study. The implication of this finding suggests that students' interest in Basic Science is not influenced by their gender.

## CONCLUSIONS

Based on the findings, it was concluded that Science-Text-Cards (STC) enhances and sustains the interest level of students in Basic Science better than Recitation Teaching Method (RTM). The interest level of students taught Basic Science using Science-Text-Cards (STC) significantly improved without gender disparity.



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