

Effect of Crossword Puzzle and Matching Word Activities On the Attitude of Primary School Pupils in Ekiti State

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Abstract:

This study investigated the effect of crossword puzzle and matching word activities on the attitude of primary school pupils in Basic Science in Ekiti State, Nigeria. The study examined the effect of crossword puzzle and matching word activities on the attitude, performance and retention ability of primary school pupils before and after being exposed to crossword puzzle and matching word activities in Basic Science. The study adopted the pre-test and post-test control group quasi-experimental design. The sample for the study comprised 180 primary pupils drawn from six primary schools in the three Senatorial Districts of Ekiti State using multistage sampling procedure from a total population of 14,830 pupils in primary schools. Two groups were involved in the study: the experimental group and the control group. The pupils in experimental group were exposed to crossword puzzle and matching word activities while the control group was taught with conventional method. Two research instruments were used, namely: Pupils' Attitudinal Scale Questionnaire on Basic Science (PASQBS) Matching Word Activities (CWPMWA) to collect relevant data from the primary schools. The face and content validity of the instruments were ensured through test re-test method while the reliability of the instruments was determined using Cronbach alpha which yielded reliability co-efficient of 0.70 and 0.82 respectively.

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The research questions raised were answered using descriptive statistic involving means, standard deviation and bar charts while inferential statistics of a two-way Analysis of Covariance (ANCOVA). All hypotheses were tested at the 0.05 level of significance.

Findings showed that there was no significant difference between the attitude of pupils exposed to experimental and those exposed to control groups indicating initial academic homogeneity of the groups. After treatment, there was a significant difference in the attitudinal mean scores of pupils in the experimental and those in the control groups. It was concluded that the use of crossword puzzle and matching word activities could enhance better and positive attitude of pupils towards Basic Science and based on the findings, it was recommended that crossword puzzle and matching word activities should be incorporated into the teaching and learning of Basic Science in primary and post-primary schools in Ekiti State and Nigeria as a whole.

Keywords: Crossword puzzle, matching word, attitude, primary school pupils, male and female,

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Introduction

Basic Science is an inquiry-oriented subject to which different learning activities is very essential. It is a subject that allows pupils' involvement in engaging in series of activities that brings about scientific processes and attitudes including effective communication and interpretation of data. In Nigeria, the study of science is of great importance, this is why a lot of emphasis has been laid on its teaching and learning. This can be achieved by the inculcation in the learners, the necessary scientific skills and attitudes.

There are various teaching strategies that can be employed in the teaching and learning of Basic Science, these include inquiry method, scaffolding, concept mapping, project method, programmed instruction and computer assisted instruction, among others. Despite these various teaching methods, pupils, according to Babayemi and Akinsola (2014), still record low performance in the subject. Hence, there is the need to introduce other innovative teaching and learning approaches that can attract learners' attention, and attitude for effective and better performance and retention in the subject being taught. Jegede and Daramola (2013) opined that appropriate learning strategies employed by the teacher must depend on learners' interest and attitude which can invariably increase and enhance enrolment in science at the upper basic class.

Attitude is a way in which an individual feels, thinks and is predisposed to act towards a particular situation which can be favourable or unfavourable, positive or negative typically directed towards some specific object. Attitude influences learning across content and domains of their cognition and involvement in the teaching-learning process. Smith and Ragan (2011) defined attitude as a mental state that disposes a learner to choose to behave in a certain way. An attitude involves cognitive, affective, and behavioural components that interact and influence instruction in the choices that learners make. Some materials such as simulation, games, films or videos are powerful tools for influencing learners' attitudes.

There are various factors attributed to academic performance of primary school pupils. These according to Ibidiran (2017) include: pupils' factors (which include; poor attitude to science, lack of interest in science, poor mathematics background), teachers' factors (such as teaching methods, hostility and unhealthy pupil-teacher relationships) and government factors (such as poor infrastructural facilities and poor implementation of educational facilities). Among these, the poor performance of pupils in Basic Science could be attributed to ineffective teaching strategies and attitudes of learners to learning. There has also been an increased awareness by researchers and educators concerned with Basic Science teaching that the conventional strategies of teaching Basic Science seem not to have been very efficient, and for effective teaching-learning to take place, some new strategies must be adopted and implemented where learning should not feel dull and not only by rote memorization where pupils learn and grasp concepts through repetition or cramming for possible change in attitude and relevant performance in the subject (Zirawaga; Adeleye and Maduku (2017).

Performance is seen as an action been processed by the cognitive domain, and attitude is a concept in education that leads to interest a pupil has that determines certain

aspects of his/her affective domain which is very important in the teaching and learning process. This showed that attitude guides and encourages pupil to think critically and keep them trying until success is achieved as ideas in the cognitive structures brings about increase in knowledge and ability to remember (retain), keep and hold what was taught and learnt. Retention increases and enhanced motivation and higher-order learning development of practical skills where substantial evidence exists. Orawiatnakul (2013) used crossword puzzle and matching word activities for his students before examinations and found that, students who took full advantage of the technique found their performance and grades to be gradually on the mend. Attitude and performance goes hand-in-hand in teaching and learning process and have intra influence on each other.

Statement of the Problem

The researcher is of the opinion that perhaps if improved teaching strategy such as crossword puzzle and matching word activities is emphasized and used among other innovative strategies in teaching Basic Science to primary school pupils, they may likely be familiar with this teaching strategy in the course of their learning and find it more interesting to use when they are in the class. Based on this premises, this study investigated crossword puzzle and matching word activities on the attitude of primary school pupils in Basic Science in Ekiti State, Nigeria.

General Question

What is the effect of crossword puzzle and matching word activities on the attitude of primary school pupils towards Basic Science?

Research Hypotheses

The following hypotheses were tested in this study.

HO₁: There is no significant difference between the attitude of male and female pupils exposed to crossword puzzle and matching word activities before and after treatment.

HO₂: There is no significant difference between the attitude of primary school pupils exposed to crossword puzzle and matching word activities and those exposed to conventional method.

Methodology

The research design adopted for this study was pretest and posttest control group quasi-experimental design. The sample of 180 pupils was drawn using multistage random sampling procedure from a total population of 18340 primary four pupils in Ekiti State. The study made use of two instruments which are: Pupils' Attitudinal Scale Questionnaire on Basic Science (PASQBS) and Crossword Puzzle and Matching Word Activities (CWPMWA). The PASQBS is divided into two sections, A and B. Section A requested the demographic information of the pupils while section B consisted of 20 items designed to elicit information on pupils' attitude towards learning Basic Science. This was structured on a four-point Likert-type scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD).

The second instrument was the researcher's self-designed Crossword Puzzle and Matching Word Activities (CWPMWA) which covered topics taught for six weeks. The items

were subjected to Cronbach alpha to establish its reliability with $\alpha=0.70$ which means that the instrument was reliable.

Results

To answer the question, descriptive statistics of mean and standard deviation were used to analyze the responses of the pupils. The result is presented in Table 1.

Table 1: Effect of Crossword puzzle and Matching Word Activities on the Attitude of Primary School Pupils towards Basic Science

S/N	ITEMS	SA (%)	A (%)	D (%)	SD (%)	MEAN	STD
1.	Crossword puzzle and matching words was a fun way to reinforce my understanding of Basic Science terms	97 (53.9)	74 (41.1)	7 (3.9)	2 (1.1)	1.52	.629
2.	Crossword puzzle and matching words helped to enhance my knowledge of Basic Science	84 (46.7)	73 (40.5)	14 (7.8)	9 (5.0)	1.71	.815
3.	Basic Science makes the world to be real and very interesting	56 (31.1)	59 (32.8)	55 (30.6)	10 (5.6)	2.11	.912
4.	Basic Science is very important in the new 9-6-4 system of education than 6-3-3-4 system	72 (40.0)	46 (25.6)	50 (27.8)	12 (6.7)	2.01	.974
5	I feel excited during Basic Science class while doing exercises on crossword puzzle and matching words	99 (55.0)	48 (26.7)	23 (12.8)	10 (5.6)	1.69	.899
6.	I prefer other subjects to Basic Science	41 (22.8)	21 (11.7)	54 (30.0)	64 (35.6)	2.78	1.159
7.	I love games, so loving Basic Science crossword puzzles and matching words will be interesting to me	49 (27.2)	102 (56.7)	13 (7.2)	16 (8.9)	1.98	.839
8.	I feel nervous when I have to solve Basic Science puzzles and matching words	41 (22.8)	53 (29.4)	78 (43.3)	8 (4.4)	2.29	.870
9.	Crossword puzzle and matching word activities	49 (27.2)	84 (46.7)	39 (21.7)	8 (4.4)	2.03	.818

	improved my understanding of Basic Science terms						
10.	Basic Science has different teaching methods that confused me	32 (17.8)	77 (42.8)	48 (26.7)	23 (12.8)	2.34	.917
11.	I am easily fed up with Basic Science crossword puzzle and matching words	46 (25.6)	36 (20.0)	61 (33.9)	37 (20.6)	2.49	2.63
12.	My mind always go blank when solving Basic Science crossword puzzle and matching word activities	45 (25.0)	42 (23.3)	28 (15.6)	65 (36.1)	2.63	1.210
13.	Government, parent and public at large should give recognition to Basic Science crossword puzzle and matching word activities	85 (47.2)	41 (22.8)	18 (10.0)	36 (20.0)	2.03	1.174
14.	Solving Basic Science crossword and matching word puzzle activities gives room for creativity	93 (51.7)	48 (26.7)	24 (13.3)	15 (8.3)	1.78	.970
15.	One needs to have pre-knowledge of Basic Science before choosing science as career in upper Basic Class	103 (57.2)	58 (32.2)	12 (6.7)	7 (3.9)	1.57	.784
16.	Basic Science helps pupils to solve scientific problems	73 (40.6)	66 (36.7)	21 (11.7)	20 (11.1)	1.93	.984
17.	I believe I can develop my potential to become future famous scientist through the knowledge of Basic Science	45 (25.0)	94 (52.2)	31 (17.2)	10 (5.6)	2.03	.804
18.	The teacher-pupils' relationship is lost when crossword puzzle and matching word activities are used	28 (15.6)	92 (51.1)	45 (25.0)	15 (8.3)	2.26	.821
19.	The use of science crossword puzzles and matching word activities will interfere with the teaching procedures	60 (33.3)	44 (24.4)	52 (28.9)	24 (13.3)	2.22	1.055

20.	Crossword puzzle and matching word activities stimulate and motivate my interest towards the learning of Basic Science	62 (34.4)	82 (45.6)	21 (11.7)	15 (8.3)	1.94	.892
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Table 1 above showed the effect of crossword puzzle and matching word activities on the attitude of primary school pupils towards Basic Science. The table showed the mean perception ranging from 1.57 to 2.78 and standard deviation values (0.629 to 2.63). It was indicated that majority of the respondent (95.0%) agreed to the assertion that crossword puzzle and matching words was a fun way to reinforce their understanding of Basic Science terms while the remaining (5.0%) held contrary opinion.

It was revealed that majority of the respondents (87.2%) agreed that crossword puzzle and matching words helped to enhance my knowledge of Basic Science while the remaining 12.7% disagreed to the assertion. It was also revealed that most of the respondents (63.9%) agreed that Basic Science makes the world to be real and very interesting while (36.1%) held a contrary view.

The table also revealed that majority of the respondents (65.6%) held that Basic Science is very important in the new 9-6-4 system of education than 6-3-3-4 system while (34.4%) held contrary opinion. It was further revealed that majority of the respondents (81.7%) agreed that they feel excited during Basic Science class while doing exercises on crossword puzzle and matching words while (18.3%) held a contrary view. The table also revealed that majority of the respondents (65.6%) opined that they prefer other subjects to Basic Science while the remaining 34.4% said they preferred Basic Science to other subjects. It was equally shown that most of the respondents (83.9%) agreed that because they love games, Basic Science crossword puzzles and matching words would be interesting to them while the remaining 16.1% held a contrary view.

It was also shown that 52.5% of the respondents indicated that they feel nervous when they have to solve Basic Science puzzles and matching words while the remaining 47.8% held otherwise. The table further revealed that majority of the respondents (73.9%) indicated that crossword puzzle and matching word activities improved my understanding of Basic Science terms while the remaining 26.1% expressed a contrary opinion. Moreover, the table revealed that majority of the respondents (60.6%) indicated that Basic Science has different teaching methods that confused them while the remaining 39.4% expressed contrary opinion. It was revealed that about half of the respondents (54.5%) disagreed that they are easily fed up with Basic Science crossword puzzle and matching words while the remaining 45.5% said they were never fed up with Basic Science crossword puzzle and matching words.

It was also revealed that most of the respondents (51.7%) disagreed that their mind always goes blank when solving Basic Science crossword puzzle and matching word activities but it was not so with the remaining 48.3%. The table also revealed that majority of the respondents (70.0%) held that Government, parents and the public at large

should give recognition to Basic Science crossword puzzle and matching word activities but the others (30.0%) did not see it that way. It was further revealed that majority of the respondents (78.4%) agreed that solving Basic Science crossword and matching word puzzle activities gives room for creativity while the remaining 21.6% disagreed.

The table also revealed that majority of the respondents (89.4%) did not believe that one needs to have pre-knowledge of Basic Science before choosing science as career in upper basic class but the other 10.6% believed that pre-knowledge of Basic Science is essential to doing well in upper basic class. It was equally shown that most of the respondents (77.3%) agreed that Basic Science helps pupils to solve scientific problems while the other 22.7% held a contrary view. It was also shown that 77.2% of the respondents indicated that they believe they can develop their potentials to become future famous scientist through the knowledge of Basic Science while the remaining (22.8%) held a contrary opinion. The table further revealed that majority of the respondents (66.7%) indicated that the teacher-pupils' relationship is lost when crossword puzzle and matching word activities are used while the remaining 33.3% expressed a contrary opinion.

The table further revealed that majority of the respondents (57.7%) indicated that the use of science crossword puzzles and matching word activities will interfere with the teaching procedures while the remaining 42.3% differed in their opinion. Lastly, the table indicated that 80.0% of the respondents affirmed that crossword puzzle and matching word activities stimulate and motivate their interest towards learning of Basic Science while the remaining 20.0% expressed a contrary opinion.

Hypothesis 1: There is no significant difference between the attitude of male and female pupils exposed to crossword puzzle and matching word activities before and after treatment.

To test this hypothesis, attitudinal mean scores of male and female pupils in the experimental group were computed and compared for statistical significance using a two-way Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is presented in Table 2 as follows;

Table 2: A two-way Analysis of Covariance (ANCOVA) Summary of Attitudinal Mean Scores of Male and Female Pupils in the Experimental Group before Treatment.

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Corrected Model	3138.066 ^a	3	1046.022	3.066	.032	.097	9.199	.700
Intercept	12059.927	1	12059.927	35.354	.000	.291	35.354	1.000
Pretest	1737.401	1	1737.401	5.093	.027	.056	5.093	.607

Group	230.889	1	230.889	.677	.413	.008	.677	.129
Gender	29.477	1	29.477	.086	.769	.001	.086	.060
Group * Gender	.816	0	.816	.035	.364	.002	.035	.
Error	29336.656	86	341.124					
Total	413375.00	90						
Corrected Total	32474.722	89						

a. R Squared = .097 (Adjusted R Squared = .065)
b. Computed using alpha = .05

Table 2 showed significant difference between the attitude of male and female pupils exposed to crossword puzzle and matching word activities before and after treatment. A Levene test was used to analyze the homogeneity of the variances. As a result of the analysis, it was found that the variances for the genders' attitude are homogeneous ($F=0.215$, $p>0.05$). Based on this result, a two-way ANCOVA was conducted. It was found that $F(0, 86) = 0.035$, $p = 0.364$, partial $\eta^2 = 0.002$. Since 0.364 is greater than 0.05 (at the 95% level of confidence, it was concluded that there was no significant difference between the attitudinal mean scores of male and female pupils in the experimental group after treatment. This implies that male and female pupils exposed to the different treatments do not differ significantly in their attitude towards Basic Science.

Hypothesis 2: There is no significant difference between the attitude of primary school pupils exposed to crossword puzzle and matching word activities and those exposed to conventional method in Basic Science before and after treatment.

Table 3: A Two-way Analysis of Covariance (ANCOVA) Summary of Difference in Attitudinal Mean Scores of Pupils in Experimental and Control Groups before Treatment.

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Corrected Model	41388.077 ^a	3	1306.021	3.011	.031	.095	9.188	.701
Intercept	11059.939	1	14259.922	37.361	.000	.282	31.154	1.000
Pre-test	1847.411	1	1847.411	5.087	.019	.047	5.094	.605
Group	220.878	1	220.878	.622	.421	.006	.656	.127
Attitude	28.418	1	28.418	.074	.718	.001	.079	.060

Group * Attitude	.012	1	.012	.003	.001	.031	.002	.001
Error	27436.617	86	351.122					
Total	28475.000	90						
Corrected Total	33574.814	89						

a. R Squared = .096 (Adjusted R Squared = .067)

b. Computed using alpha = .05

Table 3 showed the difference between the attitude of primary school pupils exposed to crossword puzzle and matching word activities and those exposed to conventional method in Basic Science before and after treatment. A Levene test was used to analyze the homogeneity of the variances. As a result of the analysis, it was found that the variances for the pupils' attitude are homogeneous ($F=0.364$, $p>0.05$). Based on this result, a two-way ANCOVA was conducted. It was found that $F(1, 86) = 0.003$, $p = 0.001$, partial $\eta^2 = 0.31$. Since 0.001 is less than 0.05 (at the 95% level of confidence), this implies that there is a statistically significant two-way interaction effect. This indicated that there was a significant difference between the attitudinal mean score of primary school pupils in the experimental and control groups. Hence, the null hypothesis was rejected.

Discussion

Findings showed that there was no significant difference between the attitude of pupils exposed to experimental and those exposed to control groups indicating initial academic homogeneity of the groups. After treatment, there was a significant difference in the attitudinal mean scores of pupils in the experimental and those in the control groups. The findings established the homogeneity of the two groups involved in the study prior to the treatment. This implies that crossword puzzle and matching word activities strategy was the most effective strategy for enhancing primary school pupils' attitude in Basic Science which is in line with the submission of Davis (2014) that crossword puzzle and matching word activities can enhance positive attitude of young children as they engaged in mental skills and active learning. The study further showed that there was no significant difference between the attitudinal mean scores of male and female pupils in the two experimental groups. This implies that male and female pupils exposed to the different treatments do not differ significantly in their attitude to Basic Science. The study found out that the use of crossword puzzle and matching word methods had positive effects on pupils' attitude towards Basic Science and was in line with the submission of Karsai and Kampis (2010) that, to increase pupils in the field of science, a different approach to teaching of science needs to be developed and accepted.

Conclusion

Based on the outcomes of the findings, the use of crossword puzzle and matching word activities enhanced better attitude and performance of pupils in Basic Science than the conventional strategy. High attitude improves pupils' performance and performance on the

other hand promotes attitude as well as non-retention retards learning, leading to poor performance.

Recommendation

Based on the findings of this study, it is recommended that Basic Science teachers should embrace the use of this innovative instructional strategy by using crossword puzzle and matching word activities in order to enhance positive attitude of primary school pupils towards Basic Science. It is further suggested that publishers and science textbook writers should include crossword and matching word activity exercises in the topics and concepts to be taught to facilitate high performance in Basic Science.

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