Effects of K-W-L Instructional Strategy on Academic Performance of Pupils in Primary Mathematics and English in Owerri North Lga of Imo State, Nigeria

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ABSTRACT

The purpose of this study was to find out if learners taught algebraic expression/elementary statistics in Mathematics and parts of speech in English Language using K-W-L instructional strategy will have better academic performance than those taught with the conventional Teacher method at 0.05 alpha levels. The researchers used quasi-experimental design which adopted the pretest, post-test Experimental group method. The area of study was Owerri North LGA Imo State, Nigeria. The population of the study was all Primary 5 learners in Owerri North Public schools. Purposive sampling technique was used to select three primary schools and simple random sampling technique was used to select classes in each of the schools. The sample of the study was 120 primary learners. The data collection instruments for the study were treatment 1 (K-W-L instructional strategies), treatment 2, (TCM [Teacher conventional method), Treatment 3 (combined TCM & K-W-L), multiple-choice questions for each subject chosen from past FSLCE and Common entrance questions. Two research questions and one null hypothesis guided the study. Mean, standard deviation and ANCOVA were the statistical tools used to analyze the data. The findings of the study revealed that the group taught with combined TCM & K-W-L achieved higher academically than the group taught with only TCM or K-W-L. The study also discovered that K-W-L instructional strategy is gender friendly. It was recommended that primary school teachers should be encouraged to use K-W-L instructional strategy to facilitate learners' performance in algebraic expression, elementary statistics and parts of speech. Furthermore Basic Education Stake holders should organize regular workshops and seminars to train and retrain teachers on the use of 21st century teaching strategies.

Keywords: Mathematics and English language, K-W-L Instructional Strategy, academic performance.

INTRODUCTION

In the history of education worldwide, especially in Africa, America and Europe, English and mathematics are regarded as the major and basic subjects at all levels of education-Primary, Secondary and Tertiary. They are prerequisites for studying any course; hence they are made compulsory for studying any course in institutions of higher learning. A lot of tasks in the educational world depend on the knowledge of

mathematics and English language. Mathematics is a way of describing relationships between number and other measureable quantities. Eluemuno & Nwikpo (2020) posits that a good reader has a better opportunity for greater achievement because he recognizes the words quickly and effortlessly as a sequence of a textual whole. Azuka (2015) Opined that mathematics is not only the language of science but an essential nutrient for thought, Logic, and reasoning. While English language is the tool for the expression of the what one feels, sees and understands. Kolawale and Ajetunnobi (2013)]. Knowledge of Mathematics and English work hand in hand. Good knowledge of English gives tap root to mathematics. Good knowledge of English enhances good knowledge of mathematics and good knowledge of mathematics lays good and solid foundation of science and technology. This means that the level of English and mathematics knowledge citizens of Al; nation have determine the level of justice science and technology components of that nations. The pivotal positions of English and mathematics to national development have made education policy makers to resolve that English and mathematics should be compulsory subjects for admissions to tertiary institutions and employment purposes Kolawole [2013]. Mathematics and English are instruments to facilitate the learning of other formal school subjects and very important tools for resolving problem situation in all disciplines.

Despite the pivotal positions mathematics and English language occupy in the field of knowledge, learners performance in these two subjects have remained consistently poor and unsatisfying. According to Nwadia [2010], this unimaginable level of poor performance in mathematics and English across all levels of education has continued to be issue of immense concern to stakeholders in education, hence a pragmatic and conscientious proactive decision and action ought to be taken by concerned stakeholders to checkmate these incidents of mass failure so as to save the nation from imminent collapse of her educational sector. Adapting universal design for learning an approach to curriculum planning and mapping that makes learning engaging and accessible to wider range of learners with different strengths and needs; use of multiple modalities in teaching and allowing students to respond to learning with a variety of assessment tools. Engaging students in collaborative planning and teaching (Eluemuno et.al)

The K-W-L strategy stands for what I know, what I want to know, and what I learnt. K-W-L is an

instructional strategy that is used to guide Learners through a text.

Learners begin by brainstorming everything they know about a topic. This information is recorded in the K column of a K-W-L chart. Learners then generate a list of questions about what they want to know about the topic. These questions are listed in the W column of the chart. During or after reading, students answer the questions that are in the W column.

This new information that they have learned is written down in the L column of the K-W-L chart.

K-W-L instructional strategy elicits students' prior knowledge, sets a purpose for the Learner to read and helps students to monitor and track their own comprehension.

How to Use a Kwl Chart

Start with column 1: know

Under the first column, here learners share what they already know about the topic at hand.

You can use the KWL chart for both group and individual learning. You may want to break the class up into small groups and then have each team share their notes with the rest of the class.

Consider drawing a chart on the board [or pulling up an online KWL chart on the projector] to fill out together as a class. Learner can also fill out their own worksheets individually as you go to help them stay

on track through the lesson.

This is a great way for teachers to see what the class already understands collectively and plan their lessons accordingly.

Fill Out Column 2: Want To Know

Once you've identified what you [or your class] already know, the next step is to fill out the "W" column. Have students answer: what do you want to know about this topic? Again, you may want to split the class into smaller groups or pairs to start the discussion and then have them share their ideas with the whole class to record on a master KWL sheet. If your class doesn't have much experience with or knowledge of the topic, provide prompting questions to help them brainstorm.

Complete Column 3: Learnt

Throughout the lesson or unit, learners can refer to their KWL chart and fill out the third column: learned. Here they will write down what they are learning and check off the questions they had listed in the second column that were answered. Learners can share anything they found interesting or surprising and identify any misconceptions they might have had from column 1.

Kwl Chart Example

Topic: Cloud

K	W	L
• There are different Types of clouds.	what are storm clouds?	Types of clouds: Stratus, cumulus, cumulonimbus, stratocumulus, altostratus, cirrus, cirrocumulus, altocumulus
• One type is called a Cumulus cloud.	How do clouds form?	When warm air rises, it cools and condenses into tiny water droplets. As more water droplets are created, a cloud forms.
• Clouds are made of water		

KWL CHART

WHAT DO I KNOW?	WHAT DO I WANT TO KNOW?	WHAT HAVE I LEARNED?

Source: DAVS AIFCE hand book on 21st century teaching strategies

K-W-L learning strategy exposes learners to self directive process which help to transform their mental abilities into task related academic skills. K-W-L strategy involves the actual mental work of the learners, involves self regulation, and helps the learner to construct a new way of understanding. K-W-L strategy which is anchored on constructivist approach to education help the learner to construct her own knowledge through active collaborative processes and also help the learner to develop and utilize learning skills like critical thinking/problem solving creativity/innovation, communication and collaboration. Daniels [2019] posited that K-W-L strategy emphasizes quality of learning rather than note memorization of content for K-

W-L learning strategy to be more effective, the instructor must teach the learners [pupils] the K-W-L processes that facilitate learning. These processes involve setting of goals or objectives, planning, self motivation, attention control, use of various learning skills, self-monitoring, collaboration and self-evaluation.

Statement of problem

English and mathematics education stake holders have been very much worried about the poor performance of pupils in FSLCE and SCEE mathematics and English despite the very important position English language and mathematics occupy in the story and history of education and examination, and their relatedness to other subjects, previous studies and previous exam results 2015-2019 obtained from exam development centre [EDC] and ministry of education Owerri Imo State revealed poor performances in mathematics, English and Igbo language are on the increase. The chief examiners report 2019 showed that majority of the candidates fail questions under elementary statistics and algebraic expression in mathematics and questions under parts of speech in English language. According to Agwagah & Benjamin [2004]. Many researchers and educators put the blame of this poor performance in mathematics and English on the inadequate instructional strategies which can actually create lack of interest of pupils in these two core subjects. It is well understood and well accepted that when pupils are taught with inappropriate instructional strategies which creates little or no interest in the pupils, the percentage of acquiring the needed knowledge and skill for the pupils total development will be very low. This study therefore investigates the effect of K-W-L 21st century instructional strategy on the academic performance of pupils in mathematics and English with emphasis on algebraic expression, elementary statistics and parts of speech. Many previous studies carried out to investigate the factors that militate against the high academic performance in English and mathematics revealed the following as major factors:

Poor teaching method Kurumeh, (2006), students negative attitude towards English and mathematics Chiadikwe (2015), Ukpebor, (2005), lack of qualified teachers Anozie (2005), overloading of curriculum. Adewale, Adesoji and Iroegbu (2004) etc. based on the above findings, education stake holders recommended that English and mathematics instructors should use facilitating methods of teaching and appropriate teaching skills during teaching and learning process in order to increase performance from pass to credit and from low score to high score in FSLCE / common entrance examination. Mathematics and English are still faced with the problem of how to improve learners performance in English and Mathemations, mathematics/ English teachers and researchers have suggested different 21st century strategies and instructional approaches. Example Nbisike [2018] studied the effect of peer tutorial on academic performance and suggested combined peer tutorial and teacher mediated instruction, habour peters cited in Igberucha [2020] compared the effect of the target task approach with the former approach on academic performance and suggested target task approach Azuka [2023] is of the view that for learners to have very good or excellent performance, psychosocial features of how humans learn must be put into great consideration in guiding the learners. Some of the psychosocial features are self regulatory and cooperative attitudes, interest and commitment. Since the 21st century learning strategy is moving away from teacher contered to learner centered the choice of teaching method that can enhance primary school mathematics and English must be based on the psychosocial features above K.L.W learning strategy is one of the strategies that make learners to become very active participants in the teaching and learning process and when applied, can improve retention, remembrance and performance in English and maths. K.W.L learning strategy make learners to become masters of their learning monitor their academic goals and motivation, manage human material resources, control their decisions and performance in teaching/learning process.

Purpose of Study

The general purpose of this study is to investigate the effect of K-W-L instructional strategy on the academic performance of pupils in mathematics and English language in Owerri North Local Government

area of Imo State Nigeria. Specifically, the study intends to:

1. Find out if any difference exists in the pretest/post-test mean scores of pupils taught mathematics and English using K-W-l Instructional strategy, normal teacher conventional method (TCM) and combined TCM/K-W.L.

2. Find out if any difference exists in the mean scores of male and female pupils taught mathematics and English using K-W-L instructional strategy

Research Questions

1. What differences exist in the pretest/post-test mean scores of learners taught mathematics and English using K-W-L instructional strategy, normal teacher conventional method and combined K-W-L and TCM

2. What is the difference between the mean scores of male and female pupils taught mathematics and English using K-W-L instructional strategy and normal teacher conventional method?.

Hypothesis

These hypotheses were formulated to guide the study and were tested at 0.05 significant level.

Ho$_1$: There are no significant differences in the mean scores of learners performance in mathematics and English test after the treatments K-W-L, TCM and combined K-W-L/TCM.

METHOD

The study which is a quasi-experimental design adopted pre-test, post-test experimental method. The study involved three experimental groups. Experimental group I received K-W-L instructional strategy as treatment, Experimental group 2 received teacher conventional method TCM as treatment and Experiemental group 3 received combined K-W-L/TCM as treatment.

The research was carried out in Owerri North Local Government Area of Imo State, Nigeria. The population of the study which was 120, comprised all primary five pupils. Purposive sampling technique was used to select three local government out of 27 local Government Areas in the State. Simple random sampling technique was used to select three schools. Intact groups of all primary 5 pupils in each school were used. The instrument for data collection in this study were 25 items mathematics achievement test [MAT] which covered algebraic expression & elementary statistics and 25 items English achievement test [EAT] which covered parts of speech all selected from past FSLCE and SCEE past question papers. The intact groups were taught. Group 1 which was the experimental group 1 was taught using K-W-L instructional strategy group 2 which was the experimental group 2 was taught using normal teacher conventional method and Group 3 which was experimental group 3 was taught with combined K-W-L/TCM. Before the experiment started, the researchers administered pre-test to both groups. Then the experimental group 1 was exposed to lessons on algebraic expression/elementary statistics and parts of speech using K-W-L instructional strategy for six weeks, the experimental group 2 was also exposed to lessons on algebraic expression/ elementary statistics and parts of speech using normal teacher conventional method for six weeks. While the experimental group 3 was exposed to lessons on algebraic expression/elementary statistics and part of speech using combined K-W-L/TCM. After the treatment, the pre-test questions were re-numbered and re-arranged and were administered as post-test to the three groups. After scoring the script, the mean and standard deviation were used to answer the research questions while analysis of covariance (ANCOVA) was used to test the hypothesis at 0.05 significant level.

RESULTS

Research question one

What differences exist in the pre-test/post-test mean scores of learners taught mathematics and English language using K-W-L instructional strategy, normal teacher conventional method TCM and combined K-W-L and TCM..

Table one: Mean scores in mathematics and English learners pre-test scores and their score at post-test when taught through K.W.L, TCM and combined K-W-L and TCM.

GROUP N	MEAN	SD	MEAN DIF
Maths/English K-W-L group			
Pre-test	22.0	10.5	
Post-test	59.0	13.4	37.0
Maths/English TCM group			
Pretest	21.9	10.6	
Post-test	43.0	5.2	21.1
Maths/English KWL/TCM group			
Pretest	22.6	21.0	
Post-test	69.0	8.0	36.4

Result on table 1 shows that the group taught elementary statistics and algebraic expression in mathematics and parts of speech in English using K-W-L learning strategy had pretest mean score of 22.0 with standard deviation of 10.5 and post test mean score of 59.0 with standard deviation 13.4. The difference between the pretest and post test mean scores was 37.0. The group taught parts of speech in English language and algebraic expression/elementary statistics in mathematics using TCM had pretest mean score 21.9 and standard deviation of 10.6 and post test mean score of 43.0 and standard deviation of 5.2. The difference between the pretest and post test mean scores was 21.1. The group taught elementary statistics and algebraic expression in mathematics and parts of speech in English using Combined normal teacher conventional method [TCM] and K.W.L had pretest mean 22.6 with standard deviation 21.0 and post test mean 69.0 with standard deviation 8.0. The difference between the pretest and posttest mean was 46.4. The result on the table shows that the means of the pretest and posttest when used TCM was 21.9 and 43.0 and mean difference was 21.1.

It can be therefore inferred that there is a difference in mean scores of the pretest and posttest when used TCM and posttest group achieved higher than the pretest group meaning that using TCM, there was effective learning occurrence by gaining a mean of 21.1. The table also shows that the mean scores of the pretest and posttest when used K-W-L are 22.0 and 59.0 respectively and the mean difference is 37.0. It can be therefore inferred that there is a difference in mean scores of the pretest and posttest when used K-W-L and posttest group achieved higher than the pre-test group, this means that using K-W-L, there was effective learning occurrence by gaining a mean of 37.0.

Similarly, Table I shows that the mean scores of the pre-test and post-test when used combined TCM/K-W-L are 22.6 and 69 and that the mean difference is 46.4. It can be therefore inferred that there is a difference in mean scores of pretest and post-test group when used TCM/K-W-L and post-test group achieved higher than pretest group. Meaning that using combined TCM /K-W-L, there was effective learning occurrence by

gaining a mean of 46.4. The result above show that the mean gain of the methods TCM/K-W-L, and TCM are 46.4, 37.0 and 21.1 respective. Meaning that while TCM is effective, K-W-L is more effective and combined TCM/K-W-L is most effective in this experiment.

Research Question Two

What is the difference between the mean scores of male and female pupils taught mathematics and English using K-W-L instructional strategy.

Table 2: mean scores, standard deviation and mean difference of male and female pupils taught mathematics and English using K-W-L instructional strategy.

GROUP N	MEAN	SD	MEAN DIFF.
Female			
Maths & English pre-tests	11.8	1.0	
Maths & English post-test	23.0	5.0	11.2
Male			
Maths & English pre-test	14.3	2.6	
Maths & English post-test	34.0	6.1	19.7

Result on table 2 shows the mean scores of male and female pupils in elementary statistics and algebraic expression in mathematics and part of speech in English language. Result showed that male pupils had pre-test mean score of 14.3 with SD 2.6 and post test mean score of 34.0 with SD 6.1 mean score difference of 19.7. While female pupils had pretest score of 11.8 with SD 1.0 and post test mean scores of 23.0 with standard deviation 5.0 and mean score difference of 11.2. The result showed that male pupils had a higher mean difference or mean gain of 19.7 than female pupils who had mean difference or mean gain of 11.2.

Hypothesis HO1: There are no significant differences at 0.05 level of significance in the mean of learners performance in mathematics and English test after treatment TCM, K-W-L and combined TCM/KWL.

Table 3: Analysis of Covariance (ANCOVA) F-test on the mean scores of the three treated groups in researcher made posttest.

Source	Sum of Squares	df	Mean Square	Com-F	Cri- F	Ls	Probability
Corrected Model	3635,25	3	12111.75				
Intercept	22721.92	1	22721.92				
Pretest	84.33	1	84.33				
Group	3455,98	2	1727.99	16.84	3.80	0.05	.000
Error	11906.34	116	102.64				
Total	443113.00	120					
Corrected Total	**15541.59**	**119**					

Table 3 shows that the F-computed (16.84) is greater than F-critical (3.80) and the level of significance (0.05) is greater than the probability (0.00). This result rejects the null hypothesis that there are no significant ($p<0.05$) differences in the mean scores of the three treated groups in researcher made posttest and accepts the alternate hypothesis that there are significant ($p<0.05$) differences in the mean scores of the three treated groups in researcher made posttest. A pair-wise Comparison test was ran on the mean scores to find out which of the groups significantly achieved higher.

Table 4 Pair-wise Comparison of the achievement of the three treated groups.

GROUP	Posttest Means	Mean Difference	Probability	Significant (p<0.05)?
Teacher Conventional Method	59.09	8.88	0.001	Yes
Combined TCM/K-W-L	67.97			
K-W-L Instructional Strategy	54.34	13.58	0.000	Yes
Combined TCM/K-W-L	67.97			

Table 4 shows that for TCM and TCM/K-W-L groups, probability (0.001) is less than the level of significance (0.05). This implies that there is significant difference in the mean scores of the two treated groups at posttest and combined TCM/K-W-L group significantly achieved higher than the TCM group.

For K-W-L and TCM/K-W-L groups; probability (0.000) is less than the level of significance (0.05). This implies that there is significant difference in the mean scores of the two treated groups at posttest and TCM/K-W-L group significantly achieved higher than the K-W-L group.

RECOMMENDATIONS

Based on the findings and results of the study, the following recommendations are made:

1] K-W-L instructional strategies should be introduced into the senior primary schools by the government and education stake holders as an instructional strategy for mathematics and English language.

2] Primary school teachers should be encouraged to use K-W-L instructional strategy by providing needed materials and infrastructures

3] Workshops and seminars on the 21st century teaching strategies should be regularly conducted for primary school teachers and they should be sponsored for such workshops and seminars.

CONCLUSION

The findings of this study showed that the academic performance on elementary statistics, algebraic expression in mathematics and parts of speech in English can highly be enhanced by the use of combined TCM and K-W-L instructional strategy and also the use of K-W-L instructional strategy helped pupils to have better understanding of elementary statistics/algebraic expressions in mathematics and parts of speech in English. This was shown in the significant differences seen in the mean scores of those taught with K-W-L instructional strategy and those taught with teacher conventional method.

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