CHECKMATING STUDENTS' LEARNING OUTCOME THROUGH META-COGNITIVE INSTRUCTIONAL TECHNIQUE

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Abstract: *This study was designed to investigate the effect of Meta-cognitive Instructional Technique on secondary school students learning outcome. It was a quasi-experimental study, pretest-posttest, non equivalent control group design was used. A total of 728 SSII students were drawn from intact classes in six secondary schools in Enugu Education Zone. Intact classes were randomly assigned experimental and control groups. Six research Questions and six hypotheses guided the study. Mean and standard deviation were used to answer the research questions while the hypotheses were tested at .05 level of significance using z-test. Major findings of the study revealed that students taught with Meta-cognitive Instructional Technique, achieved higher than their counterparts taught with expository method. There was no significant difference between the achievement scores of male and female secondary school students taught with Meta-cognitive Instructional Technique. It was recommended that secondary school teachers should adopt Meta-cognitive Instructional Technique for teaching their students.*

INTRODUCTION

Meta-cognition according to Flavell (2005), means knowledge about one's own learning. It involves monitoring and consequent self regulation for which ones own mental activities become the object of reflection. The notion of meta-cognition was coined by Flavell to explain why different children of different ages deal differently with learning tasks, (Kail, 2004). Meta-cognition is the knowledge about these operations and how they can be used to achieve a learning goal. Meta-cognition can be seen as thinking about: knowing "what we know" and "what we don't know" (Blakey and Spence, 2000). The basic meta-cognitive strategies are;

- Connecting new information to former knowledge
- Selecting, thinking strategies deliberately
- Planning, monitoring and evaluating thinking process.

Studies by (Cam, 2001), Walraven and Reitsman (2002) among other show that increase in learning has followed direct teaching of these thinking strategies. These results suggest that direct teaching of these thinking strategies may be useful, and that personal use develop gradually. Meta-cognition is obviously a very broad concept. It covers everything an individual knows that relates to how information is processed.

No doubt, meta-cognitive instructional techniques sounds were effective. Expectedly, such instructional technique should enhance students learning outcomes. Unfortunately, research evidences have reported conflicting findings on the effectiveness of the meta-cognitive instructional technique with respect to students learning outcome. What is obtainable are varying reports. Some researchers reported that meta-cognitive instructional technique promoted students' learning outcome, some others reported that meta-cognitive instructional technique inhibited students' learning outcomes, yet, a few others still reported no significant effect of the meta-cognitive instructional technique on students' learning outcomes. This situation is worrisome especially given the fact that the success of any educational level is measured by the learning outcomes of the recipients of such education (students). To solve this problem, there is need for more investigations on the effect of meta-cognitive instructional technique on students' learning outcomes. This study is therefore not only vital but very timely.

PURPOSE OF THE STUDY

The purpose of this study was to investigate the Effects of Meta-cognitive Instructional Technique on student's Learning outcome. Specifically, the study aimed at investigating the effects of Meta-cognitive Instructional Technique on senior secondary school two (SS2) students';

I.   average academic achievement in first term examination

II. average academic achievement of male and female students in first term examination

III. average academic achievement in second term examination

IV. average academic achievement of male and female students in second term examination

V.   average academic achievement in third term examination

VI.   average academic achievement of male and female students in third term examination

RESEARCH QUESTIONS

The following research questions guided the study

1. What are the average academic achievement scores in first term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

2. What are the average academic achievement scores in first term examination of male and female students taught with meta-cognitive instructional technique?

3. What are the average academic achievement scores in second term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

4. What are the average academic achievement scores in second term examination of male and female students taught with meta-cognitive instructional technique?

5. What are the average academic achievement scores in third term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

6. What are the average academic achievement scores in third term examination of male and female students taught with meta-cognitive instructional technique?

HYPOTHESES

The following research hypotheses were tested at .05 level of significance

1. There is no significant difference between the average academic achievement scores in first term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

2. There is no significant difference between the average academic achievement scores in first term examination of male and female students taught with meta-cognitive instructional technique.

3. There is no significant difference between the average academic achievement scores in second term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

4. There is no significant difference between the average academic achievement scores in second term examination of male and female students taught with meta-cognitive instructional technique.

5. There is no significant difference between the average academic achievement scores in third term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

6. There is no significant difference between the average academic achievement scores in third term examination of male and female students taught with meta-cognitive instructional technique.

METHODOLOGY

The research design adopted in the conduct of this investigation was quasi-experimental design. Specifically the design was a pretest –posttest, non equivalent control group design. The area covered in this study was Enugu Education Zone of Enugu State consisting of Enugu East, Enugu North and Isi Uzo Local Government Areas. The population for the study consisted of all senior secondary two (SSII) students in all the secondary schools in Enugu Education Zone of Enugu State, numbering twenty-one thousand, nine hundred and one (21,901) students as at the time of this study.

A sample of Seven hundred and Twenty eight (728) senior secondary school II (SSII) students was used in the study. The sample was made up of seventy six (377) students in the experimental group and sixty four (351) students in the control Group. The sample also composed of 484 female students and 244 male students. This sample was obtained from intact classes randomly drawn from six schools, two from each of the three local government areas that make up Enugu education zone.

EXPERIMENTAL PROCEDURES

The researcher trained the regular teachers in the six secondary schools used in the study for a period of two weeks on the use of the Meta-cognitive Instructional Technique used in this study. The experimental groups in each school were taught their usually subjects with Meta-cognitive Instructional Technique while the control groups in each school were taught the same subjects using expository method. Results of the students' first term, second term and third term examinations were used in data analyses. Research Questions were

answered using mean statistics and standard deviation. Test of hypotheses were done with z-test statistics at .05 level of significance.

RESULTS

Research Question One:

What are the average academic achievement scores in first term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

Table 1: Students' average academic achievement scores in first term examination

Group	n	Average score	Standard deviation
Experimental	377	60.21	1.222
Control	351	43.03	0.989

From table 1, the experimental group scored 60.21 with a standard deviation of 1.222 while the control group scored 43.03 with a standard deviation of 0.989.

Research Question Two:

What are the average academic achievement scores in first term examination of male and female students taught with meta-cognitive instructional technique?

Table 2: Male and female students' average academic achievement scores in first term examination

Group	n	Average score	Standard deviation
Male	244	59.24	0.231
Female	484	58.71	0.333

From table 2, the male students scored 59.24 with a standard deviation of 0.231 while the female students scored 58.71 with a standard deviation of 0.333.

Research Question Three:

What are the average academic achievement scores in second term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

Table 3: Students' average academic achievement scores in second term examination

Group	n	Average score	Standard deviation
Experimental	377	70.29	0.808
Control	351	46.11	1.003

From table 3, the experimental group scored 70.29 with a standard deviation of 0.808 while the control group scored 46.11 with a standard deviation of 1.003.

Research Question Four:

What are the average academic achievement scores in second term examination of male and female students taught with meta-cognitive instructional technique?

Table 4: Male and female students' average academic achievement scores in second term examination

Group	n	Average score	Standard deviation
Male	244	68.11	1.021
Female	484	69.34	0.666

From table 4, the male students scored 68.11 with a standard deviation of 1.021 while the female students scored 69.34 with a standard deviation of 0.666.

Research Question Five:

What are the average academic achievement scores in third term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method?

Table 5: Students' average academic achievement scores in third term examination

Group	n	Average score	Standard deviation
Experimental	377	76.06	1.206
Control	351	42.43	0.513

From table 5, the experimental group scored 76.06 with a standard deviation of 1.206 while the control group scored 42.43 with a standard deviation of 0.513.

Research Question Six:

What are the average academic achievement scores in third term examination of male and female students taught with meta-cognitive instructional technique?

Table 6: Male and female students' average academic achievement scores in third term examination

Group	n	Average score	Standard deviation
Male	244	77.00	1.410
Female	484	76.87	1.323

From table 6, the male students scored 77.00 with a standard deviation of 1.410 while the female students scored 76.87 with a standard deviation of 1.323.

Hypotheses 1

There is no significant difference between the average academic achievement scores in first term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

Table 7: z-test analyses for hypotheses 1

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Experimental	377	60.21	1.222			Significant
Control	351	43.03	0.989	3.41	1.96	

From table 7, z-calculated is 3.41 which is greater than the z-critical (1.96). Hence, hypothesis one is rejected as stated because there is a significant difference between the average academic achievement scores in first term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method in favour of those taught with meta-cognitive instructional technique.

Hypotheses 2

There is no significant difference between the average academic achievement scores in first term examination of male and female students taught with meta-cognitive instructional technique.

Table 8: z-test analyses for hypotheses 2

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Male	244	59.24	0.231			Not Significant
Female	484	58.71	0.333	0.88	1.96	

From table 8, z-calculated is 0.88 which is less than the z-critical (1.96). Hence, hypothesis two is not rejected as stated because there is no significant difference between the average academic achievement scores in first term examination of male and female students taught with meta-cognitive instructional technique.

Hypotheses 3

There is no significant difference between the average academic achievement scores in second term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

Table 9: z-test analyses for hypotheses 3

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Experimental	377	70.29	0.808			Significant
Control	351	46.11	1.003	2.57	1.96	

From table 9, z-calculated is 2.57 which is greater than the z-critical (1.96). Hence, hypothesis three is rejected as stated because there is a significant difference between the average academic achievement scores in second term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method. and their counterparts taught with expository method in favour of those taught with meta-cognitive instructional technique.

Hypotheses 4

There is no significant difference between the average academic achievement scores in second term examination of male and female students taught with meta-cognitive instructional technique.

Table 10: z-test analyses for hypotheses 4

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Male	244	68.11	1.021			Not Significant
Female	484	69.34	0.666	1.04	1.96	

From table 10, z-calculated is 1.04 which is less than the z-critical (1.96). Hence, hypothesis four is not rejected as stated because there is no significant difference between the average academic achievement scores in second term examination of male and female students taught with meta-cognitive instructional technique.

Hypotheses 5

There is no significant difference between the average academic achievement scores in third term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method.

Table 11: z-test analyses for hypotheses 5

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Experimental	377	76.06	1.206			Significant
Control	351	42.43	0.513	4.33	1.96	

From table 11, z-calculated is 4.33 which is greater than the z-critical (1.96). Hence, hypothesis five is rejected as stated because there is a significant difference between the average academic achievement scores in third term examination of students taught with meta-cognitive instructional technique and their counterparts taught with expository method in favour of those taught with meta-cognitive instructional technique.

Hypotheses 6

There is no significant difference between the average academic achievement scores in third term examination of male and female students taught with meta-cognitive instructional technique.

Table 12: z-test analyses for hypotheses 6

Group	n	Av.Score	Standard Dev	z-cal	z-critical	Remark
Male	244	77.00	1.41o			Not Significant
Female	484	76.87	1.323	0.53	1.96	

From table 12, z-calculated is 0.53 which is less than the z-critical (1.96). Hence, hypothesis six is not rejected as stated because there is no significant difference between the average academic achievement scores in third term examination of male and female students taught with meta-cognitive instructional technique.

SUMMARY OF FINDINGS

The results presented revealed the following:

1. The student taught with Meta-cognitive Instructional Technique achieved higher than those taught with expository method in the first term examinations.

2. The student taught with Meta-cognitive Instructional Technique achieved higher than those taught with expository method in the second term examinations.

3. The student taught with Meta-cognitive Instructional Technique achieved higher than those taught with expository method in the third term examinations.

4. Male and female students taught with Meta-cognitive Instructional Technique did not differ significantly in their average academic achievement.

DISCUSSION

Learning is a concept that is not easily defined, reason being the interdisciplinary nature of the concept of learning, (Onyeneje, 1997). However, Reading (1976), defines learning as the acquisitions of dispositions. For him learning is not the same thing as learners outcome since

what an organism learns may be displayed which is not a product of learning. Sometimes lack of incentives or environmental conditions could prevent or hinder the expression of a learned behaviour. This is perhaps why reading considers learning as a behaviour potential which specifies what the organism is capable of doing. Simply put, learning refers to changes in an organism's behavioural repertoire rather than a change in behaviour. This is so on the ground that behaviour is not necessarily an indicator of learning. It therefore, follows that learning is just one of the factors which influence learning outcome or behaviour, and also that learning outcome is not an absolute measure of learning. Psychologists have provided evidences that fatigue, physiological characteristics, sensory adaptation, sensitization and habitation, motivation among other influence performance. These factors or variables other than learning that are capable of influencing how an organism behaves or performs are called non-among the unlearned responses in an organism's behavioural repertoire, (Onyeneje, 1997).

CONCLUSIONS

Based on the findings of this study, the following conclusions were made;

1. Meta-cognitive Instructional Technique enhances secondary school students' learning outcomes (academic achievement).

2. Students gender did not significantly influence the effect of Meta-cognitive Instructional Technique on students learning outcome

RECOMMENDATIONS

Consequent upon the findings of this study, the following recommendations are made;

1. Meta-cognitive Instructional Technique should be used in teaching secondary students to improve their learning outcomes.

2. Secondary school teachers should be trained through seminars, workshops and in-service trainings on the use of Meta-cognitive Instructional Technique.

REFERENCES

1. Blakey, C and Spence, A. (2000). Developing Meta-cognition. wwwERICdigest online/informationanajyses.com

2. Cam, B. (2001). Teaching study skills, cognitive strategies and meta-cognitive skills through self diagnosed learning styles. http://www.schoolcounsellor/wisely.com

3. Flavell, V.R (2005). *Cognitive Development* (4th Ed). Eagle wood Cliff New Jersey Pretice-Hall

4. Kail, D. (2004). Education, manpower and economic growth: strategies of human resources development. New York: Vc-Mckey Press.

5. Onyeneje, E.C (1997). *Elements of Learning Process for Undergraduate Students.* Enugu: UKODIHE Limited.

6. Reading, H.F (1976). *A Dictionary of the Social Sciences.* London: Routledge and Kegan Paul

7. Walraven, S and Reitsman, G. (2002). Activating Prior knowledge as process Oriented Strategy. www.sciencejournaloneline.edu.com