
Effects of Cognitive Restructuring on Students' Academic Achievement in Science in Ughelli
North Local Government Area of Delta State

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ABSTRACT

The major focus of this work was to determine the effects of cognitive restructuring on students' academic achievement in science in Ughelli North Local Government Area of Delta State. The population consisted of all the government owned public schools both in the urban and rural area, while a sample of one hundred and twenty five student was drawn from four intact classes; two rural and two urban with sixty (60) males and sixty-five (65) female students. Three research questions and three research hypotheses were raised and formulated to guide the study. The design of the study is Pre-test. Post-test quazi-experimental using intact classes randomly assigned experimental and control group. The Sample Random Sampling Technique through balloting (Withdrawal and Replacement) was used to select the urban and rural schools. Science Achievement Test (SAT) and instructional packages were the instrument used for the study. SAT was subjected to face and content validity and reliability. Using the Pearson's Product Moment Correlation, a reliability Coefficient of 0.80 was obtained. Four science teachers one from each school served as research assistant. The t-test analysis tested at 0.05 level of significance, mean and standard deviation were used to analyze data. The result of data analysis showed that cognitive restructuring was effective in promoting students' academic achievement in science and that the technique is sex friendly. Based on the findings, it was recommended that cognitive restructuring should be embedded in the science curriculum as a technique, science teacher and counsellor should be trained on how to apply the technique effectively in promoting students' academic achievement.

INTRODUCTION

Science remains the fundamentals and basic tool for man's progress and development. As it is envisaged that an emerging virile populace armed with scientific and technological literacy shall be free from superstition, poverty, ignorance, hunger and disease (Mohammed and Bello, 2010). Science literacy is indispensable in achieving technological development of any nation. It is an aspect of cultural literacy which centres on functional understanding of the nature of science. A scientifically, literate person is hindered from exercising full potential in the socio-economic development of his community in his modern society.

The study of science yield both theoretical and practical knowledge about the environment which can be used to manipulate and harness the force and resources of nature for human development and well-being.

According to Nwosu (2008), science is being presented to students in two viewpoints: namely, the static view and the dynamic view. The static view sees science as a way of explaining the universe in which we live, while the dynamic view regards science as an activity.

The importance of science in a national development cannot be overemphasized hence science educators have continuously sought ways to make the teaching and learning of science more effective in the secondary school. Science is taught through two main categories Basic Science in the Junior Secondary Schools and the separate science subjects of Chemistry, Physics and Biology in the Senior Secondary. However, it is worrisome when research studies point to the direction of students' low achievement in secondary school science.

Effective teaching has to do with application of teaching skills and methods. In the teaching and learning process; learning can take place through the teacher exhibition of behaviours that can stimulate the learner's natural gateways to learning (Ifegbo, 2010). The skills in enhancing learning has been a major concern of many scholars, educators particularly Guidance, Counsellors who seek diverse ways of enhancing students' level of achievement particularly in core Science Subjects and Mathematics (Dossey & Usiskin, 2000). According to Dahir and Stone (2003), students don't learn automatically, particularly in mathematics and science and that they need guidance and direction before real interest is developed eventually leading to effective learning. Some of the diverse ways sought by Guidance, Counsellor includes trying to adopt the technique of cognitive restructuring to encourage the students who have unconsciously developed a phobia for the subject and to re-address their minds with positive statements.

Cognitive restructuring is a type of therapeutic technique which refutes ones irrational ideas and replaces them with rational ones. It is employing self-statements, arguments and disputations to make the client (learner) see irrationality in his/her behaviour and to be able to devise positive alternative ways to such irrationally in case the urge arise in the future from peer pressure and societal beliefs.

According to Sink (2005), cognitive restructuring is a process of changing ones thought ego and feeling, via self-talk (internal verbalization), while Moore, Zoellner and Bittinger (2004) stress that cognitive restructuring generate meaningfulness, building insightful relationship amongst learning materials, providing encouraging new materials and constituting the most orderly efficient and stable way of retaining them for future availability. Again, Strayhorn (2002), observed that cognitive restructuring is based on the idea that people (learners students) emotion and behaviour can be generally affected by what they think and for that reason, people should consciously discourage from irrational thought that breed. Misconception which could hamper their level of achievement.

However, behaviour therapist have recently begun to consider the effectiveness of cognitive restructuring procedures and the way individual achieve their optional goals in life if demoralizing self-talk are discarded and positive self-talk are encouraged (Maron & Hermesh, 2003). Memullin (2005), affirms that human beings are generally rational but that they can develop irrational belief and neurotic behaviour as a result of biological and social force. This invariably affects the psyche of learner which invariably has adverse effect on performance of school students. In the word of Bandura (1997), people's personal expectation for achievement play an important role in enhancing their desire to succeed. For instance, if a learner/student

believe that his effort at studying will lead to a good grade in his/her examination, he/she will be motivator to study. This is why any student who will constantly have a positive mind-set to achieve success in science will always excel.

Based on this background, the present research was committed to finding the effects of cognitive restructuring technique in enhancing science achievement amongst secondary school students.

Purpose of the Study

The purpose of the study is to determine the effects of cognitive restructuring technique in enhancing science achievement of students. Specifically, the study seek to

- i. Determine the effect of cognitive restructuring in improving students' achievement in science.
- ii. find out if there is any difference in students achievement test scores between male and female students who are exposed to cognitive restructuring.
- iii. Find out if location has effect on students exposed to cognitive restructuring.

Research Questions

1. Is there any difference in the mean achievement scores of students exposed to cognitive restructuring and those that were not exposed?
2. Is there any difference in the mean achievement scores of male and female science students exposed to cognitive restructuring?
3. Is there any difference in the mean achievement scores of urban and rural science students exposed to cognitive restructuring?

Research Hypotheses

1. There is no significant difference in the mean achievement test scores between those exposed to cognitive restructuring and those that were not exposed.
2. There is no significant difference in the mean achievement test scores between male and female science students exposed to cognitive restructuring.
3. There is no significant difference in the mean achievement test scores of urban and rural science students exposed to cognitive restructuring.

METHODOLOGY

The major purpose of this study was to determine the effects of cognitive restructuring on students' academic achievement in science. To guide the study, three research questions and three research hypotheses were asked and formulated. The design of the study was a non-randomized pre-test, post-test control group quazi-experimental design using intact classes. The population consisted of all Senior Secondary School Science students in class II in Ughelli North Local Government Area of Delta State with a sample of one hundred and twenty-five (125) students which consisted of sixty males and sixty-five female students. Two schools were randomly selected from the urban and rural area of the Local Government Area. Four science teachers from each schools served as instructor and were trained and used to present the content materials to the students. The intact classes were randomly assigned experimental and control

group through balloting using the replacement and withdrawal technique. The instrument used was the Science Achievement Test (SAT). Face and content validity was ascertained by groups of experts from Measurement and Evaluation and Science Education. Using Pearson's Product Moment Correlation, reliability co-efficient of 0.78 was obtained. Both groups were pretested before treatment and post tested after treatment. The experimental groups were exposed to cognitive restructuring while the control group where not. Mean, standard deviation and t-test analysis tested at 0.05 level of significance were used to analyze data.

RESULTS

Table 1: t-test analysis of students exposed to cognitive restructuring and those not exposed in science

Variables	N	\bar{X}	SD	Df	t-cal.	t-crit.
Cognitive Restructuring	73	9.4	6.25	45	2.14	1.96
Control	52	3.2	1.9			

Table I shows the calculated value of 2.14 is greater than the table value of 1.96, hence the null hypothesis is rejected. This implies that there is a significant difference between students' exposed to cognitive restructuring and those not exposed to cognitive restructuring.

Table 2: t-test analysis of male and female students exposed to cognitive restructuring science

Variables	N	\bar{X}	SD	Df	t-cal.	t-crit.
Male	60	8.13	3.72	158	0.27	1.96
Female			3.31			

Table II above revealed that the calculated value of 0.27 is less than the critical value of 1.96 at 0.05 level of significance, hence the null hypothesis is accepted. This mean there is no difference between the achievement of male and female students exposed to cognitive restructuring in science.

Table 3: t-test analysis of urban and rural science students exposed to cognitive restructuring

Variables	N	\bar{X}	SD	Df	t-cal.	t-crit.
Urban	82	5.3	3.5	45	2.14	1.96
Rural			0.9			

The above table shows that the calculated value of 2.14 greater than the critical value of 1.96 at 0.05 level significance, hence the null hypothesis is rejected. This implies that there is significant difference between the achievement of urban and rural science students exposed to cognitive restructuring.

DISCUSSION OF RESULTS

The results of the data analysis indicated shows that cognitive restructuring was very effective in enhancing students' achievement in science. While students exposed to cognitive restructuring had a mean score of 9.4 and standard deviation of 6.25 those that were not exposed had a mean score of 3.2 and standard deviation of 1.9. The t-test analysis also shows a significant difference. The result of the study is in agreement with the findings of Dossey and Usiskin (2000), who contended that cognitive restructuring if effectively adopted would to a large extent lead to students' high academic achievement in science and mathematics. This also agree with Dattilio and Montano (2005) who asserted that Counsellor have used cognitive restructuring to promote achievement and the strategy seem widely accepted. Antoni (2003), in his study showed that students who used cognitive restructuring performed better than those without cognitive restructuring.

Another findings indicated that there was no significant difference between male and female students exposed to cognitive restructuring. This shows that cognitive restructuring is sex friendly Leslie (2000) expressed that certain kinds of self-verbalizations may produce emotional responses which influence the individual performance level irrespective of sex. He is of the opinion that when self-verbalization is positive, performance level is enhanced and achievement goals become attainable. This also is in agreement with Sink (2005), who of the opinion that cognitive restructuring is a process of changing one's thought, ego and feelings via self-talk or internal verbalization leading to achievable goals irrespective of sex. However, this was at variance with Romberg (2000) who observed in his study that male always performed better than their female counterparts when exposed to cognitive restructuring in mathematics.

Furthermore, the results also revealed that students in urban area performed better than their counterparts in the rural area. While the mean score of students in the urban schools was 5.3 and a standard deviation of 3.5, that of the rural schools had a mean score of 1.8 and a standard deviation of 0.9. This also confirmed the t-test analysis of significant difference. Most rural students develops a phobia for sciences and once this phobic is imbibed, a proceeding negative attitude ensues then the students begins to avoid science and the end result is failure. Tony (2003), opined that every human being (students) who gets disturbed has internalized chain of false statements and it is what constitutes neurosis which is a mental illness in which the individual begins to develop a sense of string feelings of fear. Most rural students are psychologically, socially and mentally disturbed which invariably have built chain of false statement which eventually affect their academic achievement in sciences.

CONCLUSION

Based on the results from data analysis, it can be concluded that cognitive restructuring is an effective technique for promoting academic achievement of science students. Also, cognitive restructuring is sex friendly. The higher concentration of qualified science teachers in urban areas indicated that students in urban areas stand a better chance of obtaining appropriate scientific instruction. This is because their teachers are both academically and professionally qualified. The bulk of unqualified teachers combined with limited scientific friendly environment in the rural

area implied that the students are losing at both ends i.e. receiving scientific instructions in schools.

RECOMMENDATIONS

1. Cognitive restructuring technique should be embedded as an aspect of the school curriculum by the State Ministry to Education since it has proved effective in promoting students' academic achievement in science.
2. The Government, Ministry of Education and school heads should organize or sponsor workshops, public lectures, and seminars for secondary school science teacher where different forms of cognitive restructuring technique will be taught and discussed.
3. School Counsellor and teachers should be empowered to make good use of the cognitive restructuring in counselling students who find it difficult to comprehend science skills.
4. Students and teachers in the rural schools should be given orientation to refute irrational ideas and replacing them with rational ones especially in sciences. Once this is accomplished the negative disturbing emotion will be eliminated along with self-defeating behavior.

REFERENCES

- Anoti, M. H (2003). *Rational Thought Replacement*. Washington, O. C. American Psychological Association 68-76.
- Bandura A (1997). *Self-efficacy: The exercise of Control*, New York: W.H Freeman, 90-98.
- Dahir, C. A & Stone, C. B (2003). Accommodation in Measure of the impact School Counsellors have on student achievement. *Professional school Counselling*, 6(3), 214-222.
- Dattilio, F. M. & Montano, A. (2005). *Cognitive Behavioural Family Therapy. A Restructuring of schemas*. *Terapia Familoare*, 79, 5-26.
- Dossey, J. & Usiskin Z (2003). *Mathematics Education in the United States 2000*, Reston Va: National Council of Teachers of Mathematics.
- Gong, T. S. K. (2003). Locus of control, Attribution style and Discipline problems in secondary schools: *Early child development and care* 173(5), 455-466.
- Ifegbo, P. C (2010). Teaching for relevance. A case for effective Microteaching and enhancement of teaching skills in lesson preparation and presentation. *Nigerian Journal of Professional Teachers* (6), 86-95.
- Leslie, A. (2000). "Theory of Mind" as a Mechanism of selective Attention in M.S Gazzaniga (Ed). *The Cognitive Neurosciences* (2nd Ed). Cambridge, M.A: IMIT Press.
- Maron, S & Hermesh H. (2003). Cognitive behaviour therapy in anxiety disorders. *The Israel Journal of Psychiatry related Sciences* 40(2), 135-144.
- Mcmullin, R. E. (2003). *Taking out your Mental Trash: A Consumer's Guide to Cognitive Restructuring Therapy*, New York, NY: WW Norton & Co.
- Mohammed, K. O & Bello, S (2010). The Effects of Science on the Nation. *Nigerian Journal of Professional teachers* (6), 29-41.
- Moore, S. A, Zoellner, L. A. & Bittinger, J. N. (2004). *Combining Cognitive Restructuring and Exposure Therapy: Toward an optional integration*. New York, NY: Springer Publishing CO.

- Nwosu, A. A. (2008): Teacher characteristics proffered by students; implication for professional development practices proceeding of the 46th Annual conference of STAN, pp. 35-39.
- Sink, C. (2005). Fostering Academic Development and Learning: Implications and recommendations for Middle School Counsellor 9(2), 128-135.
- Strayhon, J. (2002). Self-control: Theory and research. *Journal of the American Academic of child and Adolescent Psychiatry*, 41, 7-16.