

COMPARATIVE EFFECT OF STRATEGIC CONTENT LEARNING ON MATHEMATICS TASK-PERSISTENCE OF SECONDARY SCHOOL STUDENTS WITH AND WITHOUT LEARNING DISABILITIES

Onyishi, Charity N¹, Onah Uchecukwu Hope²,
Liziana N. Onuigbo *Phd*³ & Uchenna Eze *Prof*⁴.

Department of Educational Foundations, University of Nigeria Nsukka.

Abstract

This study investigated the effect of strategic content learning on the task-persistence of students with and without mathematics learning disability in inclusive classroom settings. The study was carried out using a sample of 146 students with and without learning disability in four intact classes in Nsukka Local Government Area drawn through multistage sampling techniques. Quantitative data were collected using task-persistence scale adapted from a standardized Persistence scale for children developed by Dubi & Arie. (1987). Data collected were analysed using mean, standard deviation and Analysis of covariance (ANCOVA). Results indicated among others, that SCL improved the task-persistence of students with learning disability as well as students without disabilities in general education settings over their counterparts in the control group who were exposed to conventional teaching method. Based on the results, recommendations were made for the teachers who teach in inclusive classrooms to adopt SCL strategies in their instructions.

Introduction

The legislation for inclusion has attracted children with diverse learning needs, strengths, multiple intelligences, talents, abilities and disabilities into the public schools. Children with diverse learning needs are now enrolled into the same classroom where all are exposed to the same curriculum irrespective of their diverse learning needs. To meet the needs of all the learners in the classroom, the regular classroom teachers are expected to use inclusive education friendly methodology and aids (Ademotoya, 2013). Such methodologies have been identified to include instructional accommodation, modification, differentiation and functional curriculum as well as provision of assistive technology required for aiding specific subject areas (Smith, 2007; Heward, 2000).

Research evidences reveal that irrespective of the demand of reaching each student according to their abilities, inclusive classroom teachers in

Nigeria consistently apply the conventional teaching method in teaching their students (Agwaga, 2013). They adopt the teacher-centred teaching practice which emphasizes lecturing rote learning/memorization, drill and practice. This method lacks sufficient stimulation of students' abstract visual reasoning abilities; it lays no emphasis on students constructing their own ideas; or stepwise solution processes (Adaramola & Obomanu, 2013; Ojo, 2011). It is the traditional method of teaching in which the teacher takes control of the teaching-learning environment (Novak, 1998). Lecture method of teaching often fails to meet the diverse needs of students in inclusive classroom settings but only attends to a fraction of students in the class who are fast enough to follow.

As a result, a good number of students who have specific needs that require some procedural interventions could lag behind in majority of the school subjects. One of the compulsory subjects where the students generally perform poorly is mathematics (Olunloye, 2010; Olusunde, 2013). Poor performance of students in Mathematics could have a negative implication for both individual and national development (Lassa, 2012; Bassy, 2010). However, majority of the students perform poorly in both external and internal examinations (West African Examination Council (WAEC), 2010; 2012; 2013 2014: 2015). These put a greater challenge on the regular classroom teachers, to source and apply strategies that would enable each child to learn according to his/her specific learning styles. Ajobiwe, (2013) noted that teachers under such condition have the responsibility to educate each child effectively, particularly in the school or classroom they would otherwise attend. So, teachers are now faced with challenges of attending to the specific needs of individual learners in the classrooms.

Developing appropriate teaching-learning method that will meet the individual needs of the learner can be effective in bridging the gap between the demand of inclusion and the achievement of learning goals for all the learners in the classroom. Buttler (1996; 1999) presented a model of teaching called strategic content learning, which can help the teacher carry along all learners in the classroom. Strategic Content Learning (SCL) is an instructional model in which the learners are guided to learn a given content and also learn the procedures involved in learning the content. During strategic content learning instruction, the teacher does not provide explicit modelling, but uses comments and questions to help students develop their own learning strategies (Buttler in Michiko and Barbara 2008). The teacher uses scaffolding techniques to guide the learners to develop their own specific strategies for learning a given task (Mickiko and Barabara 2008). Buttler (1996) perceives strategic content learning as a process and a product which involves the

teacher guiding the learner to choose a task (self-initiation) and guiding him/her through a self-regulated learning cycle of goal setting and regulating ones effort to reach the goal.

To this effect, rather than focusing only on learning the content, Strategic Content Learning (SCL) model equips the learners with calibrated learning strategies appropriate for the given content. The teacher guides the learner to engage in the cycle of self-regulated activities associated with successful learning. Such activities include analyzing task requirements, selecting, adapting, inventing and implementing strategies for learning the task, monitoring progress, and revising and evaluating goals, strategies or both. The key principle of this model is that, together with learning the content, the learners will construct meta cognitive knowledge, motivational beliefs and resource management skills that may enhance their and task-persistence. As such, the learners could become mastery learners who persistently involve in tasks irrespective of difficulties, distractions and challenges.

This teaching-learning model is anchored on the constructivists' view of learning which emphasizes the active role of the learner in building understanding and making sense of information in a social context. Buttler (1996) conducted a research which indicated a positive effect of strategic content learning on task performance, achievement, meta cognition, self-efficacy, attributions, strategy development, and transfer of strategy use among students with learning disabilities. However Buttler's work was conducted on students with learning disabilities in isolated setting.

The present study, therefore, sought to find out whether SCL has any effect on students with learning disabilities in inclusive classroom learning environment. The study also sought to investigate the effectiveness of SCL in enhancing uniformly task-persistence of students with learning disabilities (LD) and students without disabilities (WD) in an inclusive classroom setting. Students with learning disabilities constitute the majority of the population of students who encounter difficulties in learning effectively under inclusive education settings. Though taught together with other students, students with LD may not benefit equally with students without disabilities (SWD) in the same classroom. The disabilities could hinder such students' progress in academic endeavours thus developing poor task-persistence which ultimately results in school drop-out (Gandhi & Varma, 2007). Evidence-based researchers suggest that poor task-persistence could be instrumental to increasing school dropout in Nigeria as country (Onuigbo & Eze, 2011; Mokrova, O'Brien, Calkins, Leerkes, & Marcovitch, 2013). Building the

students' task-persistence skills can therefore be of great benefit to Educational system for effective retention of the students in schools.

Task persistence is defined as the length of time and amount of effort a learner is able to apply in order to master a task, solve a problem or attain a goal (Joubert and Andrews, 2010). It can also be defined as the extent to which an individual carries in providing answer to a given problem or task. Curiosity, interest, emotions and motivation sustain the task persistence of the learner. The type of goal and goal orientation an individual has determines his/her task persistence (Woolfolk, 2011). High task-persistence is one of the characteristics of mastery-oriented learners who are not worried about their present performance, but focus on the mastery of the task. Another factor that explains the learner's persistence is the type of lesson scenario the learner is exposed to. Thus it was noted that, for students to succeed in mathematics, there is a need to strike a balance between a task that has sufficient opportunities for success and that which requires considerable effort (Woodward and Brown, 2006). To master the task therefore, students need a quantum of persistence which in turn improves their learning outcome attainment.

The study investigated the effect of strategic content learning on mathematics task-persistence and learning outcomes of students with diverse learning needs.

It specifically investigated the:

- Effect of strategic content learning on task-persistence of students with learning disabilities in inclusive classroom.
- Effect of strategic content learning on the task-persistence of students without disabilities in inclusive classroom setting.

Six research questions were formulated to guide the study.

1. What is the mean mathematics task-persistence scores of students with learning disabilities exposed to strategic content learning and those exposed to conventional method of mathematics instruction?
2. What are the mean mathematics task-persistence scores of students without disabilities exposed to strategic content learning and those exposed to conventional method of mathematics instruction?

While the following six null hypotheses were formulated and tested at 0.05 level of significance.

There is no significant difference in the mean task-persistence scores of students with learning disabilities who are exposed to strategic content learning and those who were taught with conventional method.

There is no significant difference in the mean task-persistence scores of students without disabilities who are exposed to strategic content learning and those who were taught with conventional method.

Method

The research adopted a pretest-posttest non-equivalent control group quasi-experimental research design. Two schools served as treatment group while the other two control group. The treatment group received instruction with Strategic Content Learning while the control group was taught using conventional teaching method.

The population of the study comprised all the Junior secondary two (JSII) mathematics students in Enugu state. The area was chosen due to their consistent record of poor mathematics WAEC results.

The sample of the study comprised 146 Junior secondary two (JSII) students who were drawn through multistage sampling techniques. Firstly, out of 30 secondary schools in the Local Government area, 19 coeducational secondary schools were purposively selected. Four out of the 19 coeducational secondary schools were selected through random sampling technique. Finally, one JSSII intact class was drawn from each of the sampled schools through random sampling technique (balloting). Based on this, four intact classes were selected and used for the study.

One instrument were developed and used for the study and they are Mathematics Task-persistence scale (MTPS).

Mathematics task-persistence scale was developed by the researchers to rate the extent to which students persist in solving mathematics problems. The scale consists of ten (30) item statements structured on a four points rating scale ranging from Not at all true (1), a little true (2), mostly true (3) and really true (4). The instrument was adapted from Persistence scale for children developed by Dubi & Arie (1987). Dubi & Arie. (1987) Persistence scale for Children is a standardized instrument made up of 40 items structured to measure children's persistence in different areas. The students are required to answer yes or no to the items of the instrument. The researchers restructured the items of the instrument to specify students' persistence in mathematics tasks in a four point rating scale. Two experts in psychology and one in measurement and Evaluation determined the face validity of the instrument. The trial testing was conducted in Uzo-Uwani Local Government Area and

data collected from the trial testing was subjected to Crombach alpha method to determine the internal consistency reliability estimate of the instrument which gave 0.83.

The treatment lasted for a period of four weeks of 20 lesson periods with five periods a week. The mathematics/strategic content learning instructional program was used to teach the students in the treatment group. This program was developed by the researcher; and validated by two experts in Educational Psychology and Education Mathematics. Their corrections and suggestions were used to produce the final version of the program but conventional teaching lesson plan was used to teach those in control group.

Before the commencement of treatment, training sessions were conducted for the mathematics teachers in the sampled classes on the implementation of the treatment programme. The researchers used the forum to teach the teachers in the treatment groups how to teach using mathematics/SCL instructional programme while the teachers of the control group were taught how to use the conventional teaching lesson plans. The face validated version of the lesson plans were subjected to field trial using mathematics teachers of the sampled schools to teach students from JS2 outside the sample schools. This was done to ensure that the lesson plans would be useable during the main study and to ensure that the lesson plans are designed to achieve the stated learning outcomes.

The treatment commenced by first administering the instrument MTPS to the students in both treatment and control groups (Pretesting). The pretest was followed by exposing the students in treatment and control groups to mathematics/SCL instruction and mathematics conventional method instruction respectively. In teaching the treatment group, the teachers acted as facilitator who guided the students through the four phases of SCL after presentation of content/learning materials. These phases involve; Analyzing the task requirements; selecting, adapting, inventing and implementing strategies for learning the task, monitoring progress and revising and evaluating goals, strategies or both. As such, mathematics tasks were presented and learned accordingly for four weeks. The control group was simultaneously taught the same content using conventional method of lecture and solving examples. After one week of completion of the research content, the students in both the experimental and control groups were given the reshuffled version of MTPS with the help of the classroom teachers who served as the research assistants.

Data collected for the study were analyzed using means and standard deviation to answer research questions and Analysis of Covariance (ANCOVA) was used to test hypotheses.

Results

Pretest-Posttest Mean Scores and Standard Deviation of Students' task-persistence.

Groups	Pretest			Posttest			Mean gain
	N	X	SD	N	X	SD	
Experimental group							
SLD	51	20.33	4.08	51	69.99	7.66	49.66
SWD	21	24.26	4.21	21	73.55	8.11	49.29
Total	72	21.34	4.08	72	70.03	8.40	49.42
Control group							
SLD	58	21.51	7.44	58	21.97	7.38	0.46
SWD	16	23.96	5.72	16	24.00	5.04	0.04
Total	74	22.16	4.89	74	22.66	5.94	0.21

Data in Table 1 above show the pre test and post test mean task-persistence scores of students with Learning disability and students without disabilities in the experimental group and those in control group (those exposed to SCL and those exposed to conventional methods of instruction). It also showed their standard deviations and mean gain scores.

The table reveals that students with learning disability in the experimental group had a pretest mean score of 20.33 and standard deviation of 4.08 in their task-persistence scale; while their post-test mean task-persistence score was 69.99 with a standard deviation of 7.66; giving a mean pre-test/post-test gain score of 49.66. The students with LD exposed to conventional method (control group) had a pretest mean task-persistence score of 21.5, with standard deviation of 7.44 while their mean task-persistence posttest score was 21.97 with a standard deviation of 7.38 giving a pretest/posttest mean gain score of 0.46. The experimental group that was exposed to strategic content learning strategies had a higher mean gain score than the students in the control group.

For the students without disabilities, those in the experimental group were also more persistent than those in the control group. The students without disabilities in the experimental group had a pretest mean score of 24.26 and standard deviation of 4.21 in their task-persistence while their post-test mean task-persistence score was 73.55 with a standard deviation of 8.11 giving a mean pre-test/post-test gain score of 49.29. The students exposed to conventional method (control group) had a pretest mean task-persistence score of 24.00, with standard deviation of 5.72 while their mean task-persistence

posttest score was 24.00 with a standard deviation of 5.04 giving a pretest/posttest mean gain score of 0.04.

Table 2: Summary of the 2-way Analysis of Covariance of Students on Task- Persistence Scale.

Source	Sum of squares	Df	Mean square	F	Sig
Corrected model	20503.240 ^a	4	5125.810	487.454	.000
Intercept	5895.379	1	5895.379	560.638	.000
LD Pre-math task	19.504	1	19.504	1.855	.175
SWD Pre-math task	20.559	1	20.559	1.704	.174
Treatment for LD	19847.942	1	19847.942	1887.498	.000
Treatment for SWD	32134.351	1	32134.351	3112.153	.000
Error	1587.837	151	10.515		
Total	214032.000	156			
Corrected Total	22091.077	155			

a R squared = .928 (Adjusted R squared = .926)

Data in Table 2 above show that strategic content learning as a factor in the study has a significant effect on the mathematics task-persistence of students with diverse learning needs (learning disability, visually impairment and students without disability) in inclusive classroom setting. This is because the calculated F-value of 1887.498 and 3112.153 in respect of the treatment as main effect on LD and SWD, are all significant at .000 levels respectively and therefore significant at .05 levels of significance. This implies that exposing students with learning disability, hearing impairment and students without disabilities in inclusive classroom to SCL during instructions significantly improved their task-persistence. Therefore the null hypotheses of no significant difference in the mean task persistence of students with LD and SWD exposed to SCL and those exposed to conventional method is rejected. Thus, there is significant difference in the post-test mean task-persistence scores of LD and SWD who were exposed to SCL and their respective counterparts who were exposed to conventional method in inclusive classroom settings.

Discussion

Data in Table 1-4 above revealed that using Strategic Content Learning strategies to teach significantly improved the Task-persistence of both students with and students without learning disability over their counterparts who were

exposed to conventional teaching method. This finding affirms that of Buttler (1993); Eze (2003) whose studies showed that SCL significantly improved achievement of students with learning disabilities. This could be further explained by the fact that strategic content learning is a strictly learner-centered approach to learning. It is also problem solving oriented and places the learner with the responsibility of learning and monitoring their learning activities. According to Zimmerman (1990), such instructional techniques improve academic achievement. Another feature of the strategic content learning which makes it effective in an inclusive classroom is that it enables the students to apply their specific learning tactics which increases their skills and chances to overcome learning tasks (Woolfolk, 2011). In consonance with the results, several empirical-based studies (e.g Adimora, Onyishi & Nwokenna, 2013; Buttler, 1993; Buttler, 1996; Eze, 2003; Woolfolk, 2011; Zimmerman, 1990) showed that SCL is efficacious in enhancing performance of students with learning disabilities. Gandhi & Varma, (2007) found that strategic content learning is capable of improved persistence of students in mathematics.

On the other hand, SCL insists on the teacher providing different instructional materials from which the students make choices of their preferences according to their learning tactics. This feature would enable the teacher to carry all the students along, irrespective of their specific learning needs. The findings of the study revealed that all the students (irrespective of their learning disability) taught using SCL had significantly higher task-persistence than those taught using conventional method.

Recommendations

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

- Teachers in inclusive classrooms should expose their students to SCL during mathematics instruction to enable them to take up the challenge of their own learning. This will no doubt equip the students with necessary skills that will help them overcome their problem of consistent failure in mathematics. Strategic content learning can also be used in teaching other content areas like Reading, Chemistry, Physics and even Social Sciences.
- Strategic content learning should be incorporated into teacher Education programmes in order to equip the potential teachers with the skills involved in SCL instruction. This will go a long way in boosting their effectiveness when they go into the field.
- The Government and stakeholders in education should organize workshops and seminars as in-service programmes for teachers to educate them on the use of Strategic Content Learning.

References

- Adaramola, M.O. & Obomanu, B. J. (2013). Correlates of Certain Ability in Mathematics Achievement Measured Using Bloom's Taxonomy Amongst Secondary School Students in Nigeria. *The Exceptional Child: The journal of the National Council for Exceptional Children*, 15 (1), 93-102.
- Ademotoya, J.A. (2013). Developing Policy Frame Work for Implementing Inclusive Education in Nigeria. *The Journal of the National Council for Exceptional Children*. 15 (1) 15-24.
- Adimora, D.E., Onyishi, C.N. & Nwokenna, E.D. (2014). Effect of strategic content learning on mathematics achievement of students with learning disability. *International Multidisciplinary Research Journal. European Academic Research* 2, (3) ISSN 2286-4822. Available at www.euacademic.org.
- Ajobiwe, A.I. (2013). Collaborative Partnership and Networking for best Practices in Inclusive Education for learners with visual Impairment. *The Exceptional Child: The journal of the National Council for Exceptional Children*, 15 (1), 60-69.
- Bassy, (2010). *Nigeria: Education and Vision 20:2020*. Retrieved from <http://www.nigerianbestforum.com/generaltopic/?P=2110>
- Agwagah, U.N.V. (2013). Improving the teaching of mathematics for attainment of seven point agenda: Implication for gender disparity. *ABACUS. The journal of the mathematical Association of Nigeria*, 38 (1), 111-121.
- Butler, D. L. (1993). *Promoting strategic content learning by adults with learning disabilities: An alternative approach*. (Doctoral dissertation Simo Fraser University, Bumby). Retrieved from www.eric.ed.gov/ERICWebportal/recor...
- Butler, D. L. (1996). The strategic content learning approach to promoting self-regulated learning: An introduction to the coordinated symposium. *American educational research association in New York*. Web.gnowledge.org/episteme3/pro-pdf.
- Butler, D. L. (1999). Strategic content learning approach to self-regulated learning: A report of three case studies. *Journal of educational psychology*, 90(4), 682 – 697.
- Eze, U.N (2003). Effect of instruction in strategic content learning on university students' achievement in selected psychological theories. *Review of Education*, 16(2), 32-43.
- Heward, W.L (2000). *Exceptional Children: An Introduction to Special Education*. Columbus, Merrill Prentice Hall.
- Lassa, P.N. (2012). *The Teaching of Mathematics for Nigerian Secondary Schools*. Fab Anieh Nig.Ltd.

- Lufi, D. & Cohen, A. (1987). A Scale for Measuring Persistence in Children. *Journal of Personality Assessment*, 51(2), 178-185
- Mickiko, K. & Barbara, L. (2008). *Evidence- based approaches for self-regulated learning*. Southern Utah University Press.
- Novak, K. E (1998). *What is conventional method*. Retrieved from <http://ehlt.finders.edu.au/.../tradeac.htm>.
- Ojo, A. E. (2011). *Comparative analysis of the effects of two instructional methods on students' achievement in English language*. (Unpublished Master' thesis) University of Nigeria Nsukka.
- Olunloye, O. (2010). *Mass failure in Mathematics: A national Disaster*. Tribune of 07/02/2010 retrieved from <http://www.tribune.com.nig>.
- Olosunde, G.R. (2013). Effect of Interactive Approach Instructional Package on Pre-service Teachers' Knowledge and Attitude Towards Mathematics. *The Journal of the Mathematical Association of Nigeria* 38 (1) 152-162.
- Onuigbo, L. N. & Eze, U.N. (2011). Effect of instruction in self-regulated learning strategy on interest, task-persistence, and accomplishment among low achieving mathematics students. *Review of Education; Institute of Education journal* 22(1) 224-144.
- Smith, D.D. (2007). *Introduction to Special Education: Making a difference*. Boston, Pearson.
- Suskie (2014). <http://www.cc.edu/site/about/assessment.evaluate>. (No title)
- West African Examination Council (2010-2015). *Chief examiners' report on May/June School certificate examination*. Lagos: Lucky star.
- Woodward and Brown (2006). Measuring components and sets of cognitive process in self-regulated learning. *Journal of Educational Psychology*, 85(4), 591 – 604.
- Woolfolk, A. E. (1995). *Educational psychology* 6th edition. Boston, Allyn & Bacon
- Woolfolk, A. E. (2011). *Educational psychology* Global edition.(11thed) Pearson educational international, Ohio State University.
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational psychologist*, 25(1), 3 – 17, New York.
- Mokrova, I., O'Brien, M., Calkins, S.D., Leerkes, E.M., & Marcovitch, S. (2013). The role of persistence at preschool age in academic skills at kindergarten. *European Journal of Psychology of Education*, 28(4), 1495-1503. doi: 10.1007/s10212-013-0177-2
- Gandhi, H & Varma, M (2009). *Strategic Content Learning Approach to Promote Self-Regulated Learning in Mathematics*.