TWO MODES OF TEACHERS' REFLECTION AND EFFECTS ON JSS STUDENTS ACHIEVEMENT IN BASIC SCIENCE

Agoro Aminat Aderonke
Emmanuel Alayande College of Education

Abstract: The study investigated the effect of two mode of Teacher's Reflection on Junior Secondary School Students achievement in Basic Science. The pretest, posttest control group quasi- experimental design was adopted for the study. The sample was made up of 294 junior secondary students from four Junior Secondary Schools in Ibadan metropolis selected using stratified random Sampling technique. The operational guide for Reflection-in-action, Reflection-on-action and the conventional teaching strategies were developed and used.

Also, Basic Science achievement test was also developed and administered by the researcher. Data collected were analyzed using analysis of covariance and description statistics to test the hypothesis at P<0.05 The result shows that the two modes of reflection instructional strategies was more effective than the conventional instructional strategy. The student in Reflection-on-action group had significantly high mean score in achievement test (x = 24.87) followed by those in reflection –in-action group (x = 21.17) while the students in control group had the least (x = 18.56). It is, therefore recommended that the two mode of reflection should be practiced and used by the Basic Science teachers in order to help student gain more in achievement. In-service training programme need to be organized for the Basics Science Teachers to disseminate the effectiveness of reflection-in-action and reflection-on-action teaching strategy.

Keywords: Reflection-in-action, reflection-on-action, teaching strategy, basic science.

Introductıon

Background and Literature

The importance of teachers in the implementation of the content of any curriculum is acknowledged all over the world. Self-evaluation and inquiry into one's own practice is important for teachers especially in the developing countries like Nigeria. A country where Teachers' salary is not being paid regularly, books are not available, and the available ones are beyond the reach of most citizen, in-service training for teacher are rare, teacher overworked and underpaid, large class size of over 50 pupils in a class little assess to professional benefit etc. The only transformation tool is reflective teaching. Reflection, according to Clarke (2007), refers to thinking about the actual teaching which involves the thought teachers have before, during and after a lesson. Reflective teaching as an inquiring-oriented approach in teacher education is considered an ambiguous term signifying a wide variety of meaning (Tom, 1985; Henderson, 1989). This could attribute mainly to three reasons.

- The varying perspective authors assume in examining reflection (Lesley, 1989)
- The teacher's education rationales designed to help habits of inquiring are ground in diverse images of the teacher, with little consensus on the meaning of particular images, e.g. Teachers as innovators, teachers as participant observers, teachers as continuous experimenters, adaptive teachers, teachers as action researchers teachers as problem solvers, teachers as political craftsmen, etc. (Tom, 1985).
- Comparing inquiring-oriented approach to teacher education to alternative views in order to generate a definition of the paradigm limits as a function of other perspectives which in themselves are not fully developed frameworks (Feiman Nemser, 1990)

Reflective teaching means looking at what you do in the classroom, thinking about why you do it, and thinking about if it works or not. It is a process 'of self- observation and self-evaluation. It is a means of professional development which begins in our classroom. It is paying critical attention to the practical values and theories which inform everyday action, by examining practice reflectively and reflexively (Bolton, 2010) Reflective practice was introduced by Donald Scion in his book: The reflective practitioner in 1983. However, the concepts underlying reflective practice are much older. It focuses on the ways people think about their experiences and formulate responses as the experience happen. This approach makes a clear distinction between "thinking on action" and "thinking in action". Thinking on action is the way of analyzing experiences as they happen while thinking in action determines how responses are formulated (Krause, 2004). This whole idea is considered as "thinking on your feet".

Reflective practice occurs at all stages of the teaching process, in planning, action (execution) and in evaluation. Leitch and Day (2000) submitted that the appeals of the use of reflective teaching by teachers is that as teaching and learning is complex, and there is not one right approach, reflection on different versions of teaching, and reshaping past and current experiences will lead to improvement in teaching. As Larrivee, (2000) agues, Reflective practice moves teachers from their knowledge base of distend skills to a stage in their careers where they are able to modify their skills to suit specific contexts and situations, and eventually to invent new strategies. In implementing a process of reflective practice teachers will be able to move themselves, and their schools, beyond theories in practice (Leitch and Day, 2000).

Reflection can occur both during and after an experiences or event. It does not have a time limit. This different time of when reflection can takes place make Schon (1983) categorized reflection into: reflection-in –action and reflection-on-action. Reflection-in-action refers to what happens when ones is presented with novel puzzles, the resolving of these puzzles in the context of action. According to Schon (1983) unites means and ends, research and practices, know and doing. This type of reflection is personal and private. It occurs as action is going on and reaction is rapid i.e. act and react. It is the ability of professionals to think about what they are doing while they are doing it. It occurs through the process of observation in the midst of an action, adjusting the action and applying the new action (Giaimo-Ballard C. & Hyatt L.,2012). Reflection-on-action on the other hand is seen as a procedure for studying immediate, at-hand events in order to understand them and develop a conceptual framework for useful practice. This is reflection after the event. Consciously undertaken, and often documented. It involves recalling one's teaching after the class. The act of reflecting-on-action enables us to spend time exploring why we acted as we did, what was happening in a group and so on. In so doing we develop sets of question and ideas place about our activities and practice. This is interpersonal and occurs after an event might take place. This is commonly understood as reflection. Reflection-on-action includes:

- Involvement in a scenario (an action);
- Recording of the scenario (for getting stable idea);
- Determinations, interpretations and evaluation;
- Formation of education construal; and
- Confirmation of determine whether the construal has meaning to other practitioner Garmin (1989) in Problete (1999).

A reflective teacher, according to Dewey (1933) is willing to engage in constant self-appraisal and development. Among other, it implies flexibility, rigorous analysis and social awareness. Also Orlich, Harder, Callahan, Travisan & Brown (2010) reported that with reflective teaching, student can work harmoniously together, foster their own learning strategies and create an atmosphere in which information sharing can take place. With reflective teaching, students will be good thinkers thereby making them a responsible citizens and good learners. For an effective teaching session, it is necessary both to stimulate pupil's interest and provide structure for the subsequent activities (Pollard, 2008) as reflective teaching according to Strouse (2001) is ideally the more efficient way to reach every student in the classroom.

This prompted the researcher to investigate the effects of the two modes of teacher reflection on instruction on Junior Secondary School Students' achievement in Basic Science.

Statement of Problem

Students' poor performance in Basic Science has been an issue attracting the attention of researchers and science educators. Several factors have been adduced to be responsible for this trend. These include the quality and effectiveness of instructional delivery and strategy used in teaching the subject which does not make a good level of achievement on the part of the students. Many teachers teach in self-isolation from their colleagues. As a result, the teacher needs to be reflective and subject their teaching to critical analysis, allow their colleague watch over them. Previous researchers have focused on various strategies such as Reform-Based Instruction, Self-regulation Strategy Collaborative Learning, and Hands-on activities as means of improving students' achievement in Basic Science. However, all these laudable methods do not bring about desirable result. Hence,

there is a need to explore other means of improving the mode of instructional delivery to improve effectiveness of teacher and students' achievement in Basic Science.

This study, therefore determined the effects of reflection-in-action and reflection-on- action teaching strategies on Basic Science Students' achievement in Basic Science.

Hypothesis

The hypothesis below was tested during the course of this research study:
There is no significant effect of Teachers' two mode of Reflection instructional strategies on Junior Secondary School Students in Basic Science.

Methods

Research Design

The pretest- posttest, control group, quasi-experimental research design was adopted for this research. This is schematically represented as follows:

Experimental group I	$0_1 X_1 0_4$
Experimental group II	$0_2 X_2 0_5$
Control group	$0_3 \quad 0_6$

where 0_1, 0_2 and 0_3 represent the pretest observations of experimental I, II and control groups respectively.
0_4, 0_5 and 0_6 represent the posttest observations for experimental groups I, II and control group respectively.
X_1 is experimental treatment of Reflection-in-action Instructional Teaching
X_2 is experimental treatment of Reflection-on-action Instructional Teaching

Selection of Participants

Junior secondary school students from Ibadan Metropolis constitute the population of this study out of which samples were drawn using stratified random sampling technique. One School was at least randomly selected in each Local Government Area making. Six (6) Schools in all. In each school an arm of JSII class was randomly selected making a total of 294 students.

Instruments

Four instruments were developed and used in the study. These include:
1. Operational Guide for Reflection-in-action Instructional Strategy (OGRIIS)
2. Operational Guide for Reflection-on-action Instructional Strategy (OGROIS)
3. Operational Guide for Conventional Teaching Strategy (OGCTS)
4. Students' Achievement Test in Basic Science (PTATIS)

Procedure for the Study

The researcher personally visit the participating teachers teaching the sample class in their respective schools and train them on how to implement the steps involved in the guides designed. Two teachers were trained for each experimental group 1and experimental group II. The training covers one week each for each of the groups. One day was use to visit the school used as control group. Pretest was administered in all the schools after the training. Four weeks was used to teach the student based on the instructional guide developed by the researcher. The researcher makes sure that the topics were based on the teachers, scheme of work so as not to disrupt the school plan for the term. At the end of the four weeks teaching the posttest was administered in each school.

Method of Data Analysis

Data collected were analyzed using Analysis of Covariance (ANCOVA). The Multiple Classification Analysis (MCA) aspect of ANCOVA was used to determine the magnitude of the performance of the various groups. Where there were significant main effects, the Scheffé Post-hoc Analysis was used to determine the sources of such significant differences.

Results and Fındıngs

Hypothesis: There is no significant effect of Teachers' two modes of Reflection instructional strategies on Junior Secondary School Students in Basic Science.

Table 1.Summary of ANCOVA of posttest achievement score of students

Source of Variance		Sum of squares	df	Mean Square	F	Sig
Covariates	PREACHVT	3939.219	1	3939.219	266.780	.000
Main Effect	TREATMENT	1686.517	2	843.258	57.109	.000*
Model		5625.736	3	1875.245	126.999	.000
Residual		4296.854	291	14.766		
Total		9922.590	294	33.750		

*Significant at P<.05

Table 1 shows that the main effect of treatment on students adjusted posttest achievement score in Basic science is significance ($F_{(2, 291)}$= 57.109; p<.05).   This means that the difference among students achievement in Basic science at the posttest level is significance. Hence the, hypothesis is rejected. It is hereby concluded that the is significance effect of teachers' two modes of reflection instructional strategy on students achievement in Basic Science.

In order to determine the relative performance levels of the two experimental instructional group and control, table 2 is presented.

Table 2.Multiple classification analysis of achievement mean scores by tteatment

Treatment + Category	N	Predicted mean	Deviation			Eta	Beta
		Unadjusted	Adjusted for factor and covariates	Unadjusted	Adjusted for factor covariates		

POSTACHV
    REF.-IN-ACTION.TET
    REF-ON-ACTION TET
 	
CONTROL
	121
	109
	65
		23.0909
		32.1468
		17.8769
			21.1691
			24.8742
			18.5577
				1.1282
				1.1841
				4.0858
					.7936
					2.9115
					3.4040
						375	420

R - .753							
R square = .567							

From table2, student exposed to the reflection-on-action instructional teaching group had higher adjusted posttest achievement mean score ($\overline{x}$ =24.87; Dev. = -2.91), followed by those in reflection-in-action instructional teaching ($\overline{x}$ =21.17; Dev.= -.79) while the student in the control group had the lowest achievement mean score($\overline{x}$ =18.56; Dev.= -3.40).. This implies that the reflection-on-action teaching strategy was the most effective followed by the reflection-in-action instructional strategy. These two instructional strategies were more effective than the conventional instructional strategy.

Further, the instructional strategy manipulated in this study constituted 42.0% to the status of students' achievement in Basic science (β = .420) and explained the dependent measure to the tune of 56.7% ($R\ square$ = .567).

Table 3 traced the actual sources of the significant effect of treatment on achievement in Basic science

Table3. Scheffe post-hoc tests of achievement by treatment

Treatment	N	X	Treatment		
			1. Ref. Rec. Teaching	2. Ref. Rec. Peer Tut.	3. Control
1. Ref.–in-action. Teaching	109	21.17			*
2. Ref.-on-.action Teachring	109	24.87			*

3. Control	65	18.56	*	*	

*Pairs slightly different at P<.05

Table 3 above shows that each of the two experiential groups significantly performed better than the control group. For instance, the Reflection-in-action ($\overline{x}$ =21.17) is significantly different from the control group ($\overline{x}$ =18.56). Also, the Reflection-on-action group ($\overline{x}$ = 24.87) is significantly different from the control group ($\overline{x}$ =18.56). Hence, the two pairs i.e Reflection-in-action group versus control and Reflection-on-action versus control contributed to the observed significant effect of instruction on students' achievement in Basic science.

Discussion

The major finding of this study is that there is a significant difference in the achievement of Basic Science Students taught using Reflective-on-action, Reflective-in-action mode of Reflective Practice and the Conventional Teaching strategies. The Reflective-on-action was the most effective strategy followed by the Reflective-in-action with the Conventional strategy been the least effective. The superiority of Reflective-on-action may be due to the fact that it give the Teacher the opportunity to rethink analyse and evaluate the lesson and plan for the future. Also here, the refletion is consciously taken and documented.

The Reflective-in-Action mode of Reflective Practice was more effective than the Conventional Strategy. This may be as a result of its shift from the instructor-centered to student-centered style where there was a construction of meaning between the teacher and the students which consequently led to high quality learning. Also this can also be due to the fact that teachers analyse their own practice which leads to an improvement in their teaching and student achievement accordingly.

Conclusion

The study has established that the Reflective-on-Action and Reflective-in-Action modes of Reflective Practice are both effective at improving Teachers' teaching effectiveness and students' achievement in Basic Science at Nigeria Junior Secondary School level. This is due to the fact that both strategies allowed the teachers to meet their classroom needs, made teaching and learning to be more flexible allowing room for change and growth and encouraged self- observation and self-regulation. It also gives room for criticism of ones teaching by colleagues.

Recommendation

Both Reflection-in-Action and Reflection-on-Action modes of Reflective Practice are good at making Basic Science students gain more in achievement at Junior Secondary School level. This is very important especially when one consider the place of Basic Science as the foundation for Science and Technology. Anything possible need to be done to improve its teaching and learning especially when one consider the quest of the country to become scientific and technologically independent nation. Reflective practice and its modes is an important step in the process of improving classroom practice which include enhancement of teaching and learning. The two modes therefore is being recommended for use at Junior secondary level to teach Basic Science Student in Nigeria.

References

Agoro, A. A. (2013). Effect of Reflective-Reciprocal Teaching Strategies on Pre-service Teachers' Achievement in Integrated Science and Science Process Skills in Nigerian Colleges of Education. An unpublished Ph.D. Thesis University of Ibadan

Bolton, G. (2010). *Reflective practice: writing and professional development*. London: Sage.

Clarke, P.A.J. (2007). *Reflective Teaching Model: A Tool for motivation, collaboration, self-reflection and Innovation in Learning*. Georgia State University.

Dewey, J. (1933). *How We Think*: A Restatement of the relation of Reflection Thinking to the Educative Process. Chicago: Henry Regnery.

Feiman-Nemser, S. (1990). "Teacher Preparation: Structural and conceptual Alternative*, In Handbook of Research on Teacher Education*, Ed. W. Robert Houston, New York: Macmillan Publishing Company, Inc."

Giaimo-Ballard C. & Hyatt L. (2012). Reflection-in-Action Teaching Strategies Used by Faculty to Enhance

Teaching and Learning. Networks. An Online Journal for Teacher Research. 14(2)

Henderson, J. G. (1989). "'positioned Reflective Practice: A curriculum Discussion", *Journal of Teaching Education*, (March-April 1989), 10-14

Krause, K. L. (2004). Reflective teaching*, Educational Psychology for learning and Teaching*, 13, 1-44, Nelson Australia press ltd. Retrieved on November, 27, 2010. http://66.102.1.104/- scholars hl=x9=cache:OWs50pgkaisj:www.thouson learning.com.au/higher/-education/krauwe/media/krause-chapter-13.pdftrekated:owsso pgkaisJ:scholar.google.com

Larrivee, B. (2000). Transforming Teaching Practice: Becoming the critical reflective teacher: *Reflective Practice,* 1(3), 293-307

Leich, R. & Day, C, (2000). Action Research and Reflective Practice: towards a holistic view' *Educational Action Research*, 8 (1), 179 -193.

 Lesley, T. S. (1989). "Editorial", *Journal of Teaching Education*, (March-April, 1989) xxxx (2)

Orlich, D. C Harder, R. J., Callahan, R. C, Travisan, M. S & Brown, A. H. (2010). *Teaching strategies. A guide to Effective instruction.* Ninth Edition Wads worth CEN GAGE learning U.S.A

Poblete, D. (1999). A Reflective Teaching Model: An Adventist Assessment. 24th International Faith and Learning Seminar Held at Andrews University, Berrien Springs, Michigan, U.S A. June 20=July2, 1999

Polland, A. (2008)*. Reflective Teaching* 3rd Edition, Continuum International Publishing group. Great Britain

Schon D.A. (1983). *The Reflective Practitioner, How Professionals Think in Action*, Basic Books.

Strouse, J. H, (2001). *Exploring Socio-Cultural Themes in Education.* Upper Saddle River, NJ.

Tom, A. R., (1985). "Knowledge Resources for improving the content of Pre-service Teacher Education" *Journal of Teacher Education*, Sept., Oct., 1985.//