

## EFFECTS OF e-INTERACTIVE AND VIDEO -BASED REFLECTIVE TEACHING STRATEGIES ON CHEMISTRY PRE-SERVICE TEACHERS' CLASSROOM PRACTICES IN NORTH CENTRAL, NIGERIA: IMPLICATION FOR CAPACITY BUILDING

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### Abstract

*This study determined the effects of e-Interactive e-IRS and Video -based reflective VBRS teaching strategies on classroom practices among Chemistry pre-service teachers in north central, Nigeria. The study adopted a pretest-posttest, control group, quasi-experimental design using 3x2x2 factorial matrix, 61 pre-service Chemistry teachers were drawn from three universities in north central Nigeria. The schools were randomly assigned to two experimental and one control groups, The two experimental groups were exposed to e-IRS and VBR respectively while the control group was exposed to conventional lecture method. The treatment lasted for eight weeks. Instrument used for data collection was Teachers' Classroom Practice Observation Scale (PTCPOS) with reliability coefficient of (0.83). Three research questions and one hypothesis was tested at the 0.05 level of significance. Data collected were analyzed using Mean and Multivariate Analysis of Covariance (MANCOVA). Findings from the study showed that treatment had significant effects on teachers classroom practices. For sustainable capacity building, it was recommended that National University Commission (NUC) and National Commission for Colleges of Education (NCCE) should as a matter of urgency include reflective teaching in the curriculum of teacher education programmes in Nigeria.*

### Introduction

It is a common fact that pre-service training given to teachers in training institutions does not fully equip them with the knowledge of subject matter and skills to impart throughout their career as teachers.

This, however, is demonstrated in their inadequacies during teaching particularly in science related subject. However studies have revealed inadequacies in the teaching and learning of science subjects particularly in Chemistry.

Some inadequacies in classroom practices observed by researchers include poor communication by Chemistry teachers as shown in their inability to explain Chemistry concepts to students for effective learning (Bee, 2012 & Babalola, 2000); use of instructional material (McLeod, 2003; Fathiah, 2007), teacher-student interaction (Udoh, 2007; Kareem, 2014 & Bee, 2012).

The inadequacies observed among Chemistry teachers in classroom practices may be attributed to the poor training Chemistry teachers had, before entry into the teaching profession. Also since pre-service teachers can only teach the way they were taught it becomes vital to teach them to be effective by systematically assessing their lesson and approaching their lessons with dynamism. In line with this, Minott (2010), defines reflective teaching as an approach to teaching, learning and problem-solving that uses assessment and evaluation as a main tool. There are different types of reflective teaching among which include e-interactive and video-based reflective teaching.

The e-interactive reflective strategy is a reflective type of self-reporting strategy where pre-service teachers' diaries may be combined with suggestions and/or feedback from tutors and/or peers of the pre-service teachers. It captures the idea

and synergy of a group by allowing individual members to share, express and reflect on the process as well as progress of pre-service teachers on Facebook (Yuskel, 2013). Another form of reflective teaching strategy used in teaching is the Video-based reflective teaching. During the reflection process, pre-service teachers will form a group on Facebook, with the researchers being members of the group to guide the discussion. The group engages in critical evaluation and analysis of their classroom activities on Facebook platform before and after the teaching. After the teaching, the group meets on the agreed time on Facebook platform for reflection to find out if the pre-service teachers teaching is in accordance with the decisions the group took during reflection before teaching. Pre-service teachers take note of the conclusion reached during reflection by the group to make necessary corrections during the next lesson.

Video-based reflective strategy is a type of self-reporting reflective teaching strategy where a video recorder is located in a place where it can capture the exchanges which take place during a lesson. With the microphone placed on the teacher's table, much of the teacher's language can be recorded as well as the exchanges of many of the students in the class for a week

or two weeks in a period and then randomly selecting a cassette for closer analysis (Pak, 1985).

Although studies conducted by some researchers have shown that reflective teaching improve pre-service teacher classroom practices, this is due to the fact that they are able to assess their lesson determine their strengths and flaws, thereby taking positive action in subsequent lessons (Hudson, 2014 & Agoro, 2013 Ogonor and Badmus, 2006)). However, most of these studies are basically in the area of English language and generally Education, no literature have been documented in the area of Chemistry.

### Statement of the Problem

The training of pre-service teachers to become effective teachers have been the concern of scholars in the field of education. However, researchers have observed that pre-service teachers show incompetence in the way they teach. This however, can be attributed to the fact that they teach in a routine and monotonous manner without necessarily critically assessing and examining what they teach and how they teach (Kareem, 2014). It is against this backdrop that this study determined and examined effects of e-interactive and video-based reflective teaching strategies on Chemistry pre-service teachers'

classroom practices in north central, Nigeria.

### Research Questions

The study answered the following research questions:

1. What is the mean scores of pre-service Chemistry teachers' classroom practices before and after treatment?
2. In which of the classroom practices did the pre-service Chemistry teachers have the highest mean gain?
3. In which of the classroom practices did the pre-service Chemistry teachers have the least mean gain?

### Hypotheses

This study tested the following null hypotheses at 0.05 alpha level:

$H_0^1$ : There is no significant effect of treatment on pre-service teachers' classroom practice: (communication, use of instructional material, teacher-student interaction)

### Research Design

The study adopted a pretest-posttest, control group, quasi experimental research design in two stages. A multi-stage sampling procedure was adopted for the study. First, purposive sampling was used to select three universities from Niger, Nassarawa and Abuja in

North Central Nigeria for the study. The criteria for the selection of the universities were universities where Pre-service teachers go on teaching practice once during their training. At the second stage, a simple random sampling procedure was adopted to assign the three universities to two experimental group and one control group. From the selected universities, only pre-service teachers that taught SSII Chemistry students participated in the study.

Based on the criteria above, a total of 18 pre-service teachers were selected (six teachers for e-Interactive reflective group; six teachers for Video-based reflective and six pre-service Chemistry teachers from the conventional group). These pre-service teachers taught a total of 694 (382 female and 312 males) senior secondary school II Chemistry students and eight research assistants participated in the study as observers. The Pre-service Teachers' Classroom Practice

Observational Scale (PTCPOS) was adapted from Murray (1983).

The face and content validity of Pre-service Teachers' Classroom Practice Observational Scale (PTCPOS) was determined by giving the instrument to research experts in education. 6 pre-service teachers who were not part of the sample to be used for the study. This is to ensure that the guide measures what it set to measure in 3 lessons for a period of 2 weeks. Three research assistants were employed as raters to observe and rate the pre-service teachers while teaching. The inter-rater index was determined using Scott's  $\pi$  0.83.

The data collected was analyzed using Mean and Multivariate Analysis of Covariance (MANCOVA)

## Results

**Research Question One:** What is the mean scores of pre-service Chemistry teachers' classroom practices before and after treatment?

**Table 1** Mean Scores of pre-service teachers' classroom practices before and after treatment

Classroom Practices	Pre-test Mean Score	Post-test Mean Score	Mean gain	Rank
Communication	10.39	17.34	6.95	2nd
Use of Instructional Materials	3.60	10.27	6.67	4th
Teachers Student Interaction	0.59	10.22	9.63	1st

Assessment Skills	9.60	14.74	5.14	5th
Use of Time	5.43	12.21	6.78	3rd

N=61

Table 1 shows that the pre-service science teacher had a relatively high mean gain as a result of the treatment in their classroom scores. The pre-service teachers had a pre-test mean score of 10.39, 3.60, and 0.59, respectively in Communication skills, Use of Instructional Materials and Teacher -Student Interaction, respectively. The Table also shows that the pre-service teachers as result of treatment had the following post-test mean scores: (17.34) communication skills, (10.27), Use of Instructional Materials and (10.22), Teacher Student Interaction respectively.

**Research Question 2**

In which of the classroom practices did the pre-service Chemistry teachers have the highest mean gain?

Table 1 shows that the pre-service Chemistry teacher had the highest mean gain in teacher-students interaction (9.63) among all the three classroom practices.

**Research Question 3**

In which of the classroom practices did the pre-service Chemistry teachers have the least mean gain?

Table1 shows that the least mean gain was in the assessment skills (5.14)

$H_0^1$ a: There is no significant main effect of treatment on pre-service teachers' classroom practices: Communication Skills Use of Instructional and teacher-student interaction skills

To test this hypothesis, table 2 for the MANCOVA is presented below:

**Table 2: Summary of MANCOVA of Post treatment of Pre-service teachers' Classroom Practices,**

Variables	Df	F-Cal	P-Value
Communication	(2,47)	10.756	0.00
Use of Instructional Materials	(2,47)	334.792	0.00
Teachers Student Interaction	(2,47)	287.58	0.00
Assessment Skills	(2,47)	160.656	0.00

Use of Time	(2,47)	15.35	0.00
F.across the subj: Wilk's lambda	(10,86)	48.69;0.23	0.00
		(5,86)	

$\lambda$ (df across the subject)

Table 2 indicates that there is a significant main effect of treatment on all the dependent measures (Communication Skills, Use of Instructional Materials, Teacher-student interaction, [wilks'  $\lambda=0.023$ ;  $F_{(10,86)}=48.693$ ,  $p<0.05$ ). Therefore the null hypothesis  $HO_1$  is rejected. This implies that treatment has significant effect on all the pre-service teachers' classroom practices

This significant main effect is true across the subject effect for all the pre-service teachers' classroom practices as shown in table 2. communication skills (wilks'  $\lambda=0.023$ ;  $F_{(2,47)}=10.75$ )  $p<0.05$ ; Use of instructional material (wilks'  $\lambda=0.023$ ;  $F_{(2,47)}=334.75$ );  $p<0.05$ ; Teacher-student interaction (wilks'  $\lambda=0.023$ ;  $F_{(2,47)}=287.58$ );  $p<0.05$ );

Table 2 indicates that there is a significant main effect of treatment on all the dependent measures (communication skills, use of instructional materials, teacher-students interaction, [wilks'  $\lambda=0.023$ ;  $F_{(10,86)}=48.693$ ,  $p<0.05$ ). Therefore, the null hypothesis  $HO_1$  is rejected. This implies that treatment has significant effect on all the pre-service teachers' classroom practices

## Discussion of Results

Findings of the study showed that there was a significant main effect of treatment on all the dependent measures (Communication Skills, Use of Instructional Materials and Teacher-Student Interaction) the introduction of treatment in the two experimental groups could be responsible for the improved classroom practices of the pre-service teachers in the study. The improvement of the two experimental groups may be attributed the assessment, evaluation, self-reflection, or goal setting of the pre-service classroom practices. This is corroborated by Ajitoni (2008) who opines that teachers do not approach their classroom practices with dynamism rather they approach teaching as a routine practice.

The e-IRS were pre-service teachers met on Facebook for reflective activities before or after the lesson were able to brainstorm, share ideas about their experiences in class and some of the remedy they adopted to resolve issues that came up during their lessons. This, however, is in line with the

submission of Yuskel (2013), who says using facebook for reflective activities allow pre-service teachers to recognize the problems they encountered quite easily and also identify the difficulties their peers experienced while teaching so as to take corrective measures for subsequent lessons. Also VBRS were pre-service teachers reflected on their classroom practices before and after the class individually through the use of video recorder to address issues they encountered during the lesson. This fact is supported by (Koc, 2011, Koc, Peker, & Osmanoglu, 2009) who observed that the use of VBRS enable pre-service teachers to connect theory and practice, improve instructions and focus on student-centred thinking as opposed to behaviours. This is also corroborated by Bain, Ballanlyne, Packer & Mills (1997) who asserted that pre-service teachers can still develop reflective skills without intensive outside feedback, depending on their opportunities for self-assessment framework and the initial reflective ability.

### Conclusion

The finding of this study showed that reflective teaching strategy was effective on improving the classroom practices and students' achievement in Chemistry. This may be attributed to the fact

that in the two strategies, pre-service teachers' reflected on their classroom practices before and after each lesson. Applying reflective teaching to classroom practice in Chemistry will make pre-service teachers depart from the routine pattern of teaching during and after training from the university.

### Recommendations

From the findings of this study, the following recommendations were made:

- 1) In order to help teachers be reflective, it is recommended that a course in teacher preparation programme should be introduced to help pre-service teachers inculcate reflective teaching practices.
- 2) National University Commission (NUC) and National Commission for Colleges of Education (NCCE) should as a matter of urgency include reflective teaching in the curriculum of teacher education in Nigeria.
- 3) Practicing teachers should be trained to have the knowledge of reflective teaching approach by organizing seminars, workshops and conferences so as to expose them to essential features of the approach in order to improve their classroom practices and enhance students' achievement in Chemistry.

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