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REFLECTIVE TEACHING PEDAGOGY: A CUTTING EDGE STRATEGY FOR ADVANCING PROFESSIONAL DEVELOPMENT AND CLASSROOM SCIENCE TEACHER COMPETENCIES

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Abstract

Reflective teaching pedagogy is gaining momentum as an effective approach to enhancing classroom teacher skills and fostering professional development. This study examines five research questions on how reflective teaching impact skills and help professional development in areas of lesson planning, pupils learning, teachers learning, reflectivity and professionalism. It was found out that reflective teaching practice has positive impact on the above factors and reflective teaching pedagogy is seen as a transformative approach to nurturing a culture of continuous improvement and innovation in education.

Keywords- *Reflective teaching pedagogy, experiential learning, classroom teacher skills, professional development, pupils learning, teacher's learning, professionalism, reflectivity.*

Introduction

Reflective teaching is a practice that encourages educators to critically examine the teaching methods, instructional strategies and classroom interactions in order to enhance their effectiveness as teachers and improve students learning outcomes. It involves experiences with the aim of identifying areas of growth and implementing changes to enhance teaching practices.

It orientates teachers towards self-focus and self-evaluation. It involves the transformation of professional values and actions of the teachers and that of others who he/she interacts with. Reflective teaching means looking at what to 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 in which strength and weaknesses are identified and then adjusted to re-plan for better performance. It is a means of professional development which begins in the classroom. It is paying critical attention to the practical values and theories which inform everyday action by examining practice relatively and reflectively (Rolton, 2010). Reflective teaching is in three phases: planning, teaching and debriefing.

Reflective teaching has to do with deliberate examination of how we teach and learn (Gatumu, 2006). It is a kind of teaching strategy which has to be viewed in terms of what the teacher can do for himself and his students to ascertain productivity in his teaching and in his student's learning. Hence, reflective teaching is a call to let the teacher combine theory and practice to maintain and sustain his teaching profession (Ige and Olukayode, 2012).

The concept, reflective teaching is also about a skilled teaching of knowing what to do. In this manner reflective teaching is a professional alternative to action research. It is a personal professional life by solving problems in a systematic manner (Gatumu, 2006). Pollard and Tann (1987) regard reflective teaching as a cyclic process by which teacher interprets his/her classroom practice. Reflective teaching enables teacher to form the known to the unknown by making use of

recalled experiences in a critical manner. It is a deliberate move to think critically of his/her teaching, so that his/her students can maximize their learning. It is a mark of a concerned teacher who is skilled enough to examine his/her beliefs, values and assumptions behind the teaching practice (Ige & Olayode, 2012).

Developing effective teachers has become one of the basic underlying principles of all teacher education courses and reflective teaching is an essential factor for the teachers. Harrison, Lawson and Wortley (2005) argues that it is more meaningful to promote reflective teaching among experienced teachers who are more intuitive whereas novice teachers take every step by careful consideration and deliberation. The skill of reflective teaching develops highly over time and this can be observed easily among the experienced teachers. Reflective teaching is used at both pre-service and in-service levels of teaching, although coaching and peer involvements are the two aspects of reflective teaching seen most often at the pre-service level.

At the level of in-service teaching (which is the focus of this study), it is observed that serving as coach or mentor peers is an effective practice for in-service teachers. Effective teaching involves careful considerations of both "sight and action" to enhance the learning through experience. By collecting information about what goes on in the classroom and by analyzing and evaluating this information, teachers identify and explore their own practices and underlying beliefs. This may then lead to changes and improvements in their teaching. Experience alone is insufficient for professional growth and that, experience coupled with reflection is a much more powerful impetus for development (Richard and Nuan in Gatumu, 2006).

Teaching is the systematic process of imparting desirable knowledge, values and skills to learners, (Filani, 2010). A teacher with training is more mature and confident to perform his task more efficiently. The quality of our human capital depends on the quality of our teachers. What students learn is directly related to what, and how teachers teach, while, what and how teachers teach depend on their knowledge, skills and commitments.Teachers are principally expected to plan, make provision and act. Reflective teachers also need to monitor, observe and collect data on their own and the student's interventions, actions and feelings.

Acquisition of appropriate scientific and technological skills is necessary to cope with the challenges of modern day work. Education training systems that respond adequately to those demands will therefore, contribute to the efforts to overcome the growing employment rate and marginalization of majority of the populace. Such systems will provide access to appropriate learning experiences designed to broaden skills and knowledge that can increase productivity.

The importance of teacher education in the nation's educational system has been amply demonstration by the popular statement in the National Policy on Education that "no educational system can rise above the quality of its teachers' (NPE, 2004). The educational system is obviously faced with the greatest challenge of the need to explore the possibility of equipping teachers with professional teaching skills that will enable them to perform their numerous assignments credibly. Since the aim of teaching is learning, good education depends on good teachers, (Adediwura and Bada, 2007).

The need to improve the quality of science teaching and learning that will enable citizens develop scientific literacy to cope with the demands of science teaching and technology growth has been the yearning of every nation in the 21st century. Ehindero and Ajibade (2000) and Adediwura and Bada (2007) supported good methods of teaching that would make the learners develop and have sound

education. To achieve the desired educational goals, teachers need to reflect on their teaching from the planning stage to the last process of their teaching in the classroom. This process according to Clarke (2003), will allow the teachers to clarify their knowledge base and content, their students' learning styles and crystallize the pedagogy to be implemented

Teachers play pivotal roles in learning and performance of their students. There is no doubt that teachers have a great responsibility to help the student succeed, the student should be assisted to hold and positively discharge their responsibility (Wenghoisky, 2002). On the other-hand teachers' performance in every parameter has a significant impact on students' understanding and performance. For instance, if a teacher is effective in teaching, his students would most likely do better in class. However, if the teacher is ineffective, the students could do much worse. It is also possible that with an ineffective or careless classroom teacher, a student could still get an 'A' grade. A student could also fail in a class with a good teacher. These issues are pointers to the extreme symbiotic relationship between the teacher and the learner (Ukoha, 2008). In Nigeria, the teacher has often been blamed for student changing fast with educators. Examining several factors that are student related or systems. There is no doubt that, various teaching strategies exist and are being used in our classrooms yet poor teaching and learning of science seems to continue unabated. This is the reason it may be necessary to develop some skills in our teacher for effective performance to examine which of these available teaching strategies actually affect the resolution of the problem.

A reason for the proceeding difficulty of science teachers in putting their lessons across to learners could be traceable to the fact that they are not properly informed of recent development and equipment with the relevant skills for new method that showcases best practices. The Macmillan English Dictionary (2007) explains innovative approach as a design that is full of new and purposively reconstruction existing ideas, for example, innovative teaching strategies simply implies knowing or identifying and applying a more facilitative (or learning ensured) approach in teaching a named science concept, topic or theme. Furthermore, it has been observed based on previous studies, that the present methods used in teaching sciences in senior secondary schools in Nigeria do not produce maximum results for the acquisition of science process skills by students (Ibe and Nwosu, 2003).

LITERATURE REVIEW

A lot of work on reflective teaching has been done, but not much has been done on acquisition of skills by teachers.

Ojanen (2002) studied how student-teachers develop the skills necessary for reflective teaching during their field experiences. He explored the role of a teacher educator as coach and found out that teacher educators most effectively coach student teachers in reflective teaching by using student's personal histories, dialogue, journals, as well as small and large group discussions about their experience to help them reflect upon, and improve their teaching. Similarly, Ogonor and Badmus (2006) studied reflective teaching practice among student-teachers in tertiary institutions in Nigeria. The findings from this study indicated that student teachers were elated and had opportunities for professional growth as they practice reflective teaching.

Agoro (2012) studied the effects of reflective reciprocal teaching and reflective reciprocal peer tutoring strategies on pre-service teachers' achievement in Integrated Science and recommended that, it enhanced student's achievement in Integrated Science, instructional strategies using reflective-reciprocal teaching and reflective-reciprocal peer tutoring and should be adopted in

colleges of education to teach Integrated Science. This study is in line with Ige and Olayode (2010) who worked on two modes of reflective teaching on students' achievements in basic science showed that, there is need to incorporate reflective teaching in Nigerian schools because the use of the combination of reflection for action and reflection in action increased academic achievement of students.

Hine (2000) linked self-reflection and meta-cognition with mentoring, her research at the University of Western Syndey, showed that student teachers who are in a mentoring relationship and fosters professional reflection develop other important professional skills such as collaboration, goal setting and self-worth. Similarly, Ogunbameru and Uwameiye (2012) studied the strategy for improving teaching practice in Nigerian Colleges of Education and suggested that reflective teaching should be adopted as a strategy for improving the teaching and learning competences of teachers in training, to adequately prepare them for their professional roles as teachers. Such skills as planning, decision making, team work, collaboration communication, adaptability, analytical, critical for survival in the twenty first century work setting should be incorporated to teaching exercise to develop in pre-service teachers (Wolters, 2010).

Pollard (2006) showed that reflective teaching leads to steady increase in the quality of education provided for children. These and similar findings led Ostroga (2006) to conclude that because reflection informs teaching practices, strategies that aim enhance reflective skills should be developed and implemented. Mclntyre as cited in Efe (2011) studied the way reflection was being theorized in the teacher education programme of Oxford University. His framework of different levels of reflection drawing on the conceptualization of Carr and Kemins (1986) in teacher education helps to clarify the level of reflection in student teacher's practices. He asserts three levels of reflection for student teachers.

Freidius (2002) described a case study of one teacher/graduate student struggling to make sense of her beliefs and practices about what constitutes good teaching, her initial pedagogy for teaching was based on the traditions and practices of direct teaching. Her traditional socialization into teaching made it difficult for her to understand that her views of good teaching were being challenged in her practice. After implementing reflective teaching techniques in her classroom, she was able to acknowledge and validate what she was learning. Similarly, Navanceedhan (2006) on the other hand studied reflective teaching pedagogy as innovative approach in teacher education through open and distance learning. The result was found to be favourable as it reflected on better academic performance of the students in whose class the reflective teaching-learning pedagogy was practiced.

The study of Norsworhty (2008) in his research work where 59% of the study respondents who were pre-service teacher in New Zealand found out that through reflective activities student teacher's prior approaches to learning was a hindrance to their capacity to learn in manners which is reflective. The respondents also identified specific problems which constituted the hindrance as follows: their dependence on receiving note in form of handout from their teachers, inability to think for themselves or get deeply engaged with the learning task due to their beliefs and disposition to rote learning and memorization as strategies to pass examination, their test strategy was to give back to the teacher one right answer, to regurgitate the content of their teacher's note.

Phases of reflective teaching

Reflective teaching fosters a continuous cycle of self-assessment and improvement in instructional strategies (Moon, 2004). Educators who engage in reflective practices often report enhanced abilities to adapt their teaching methods to meet the diverse needs of students (Darling-Hammond & Bransford, 2005). Research suggests that reflective teaching promotes effective classroom management skills by encouraging educators to identify and address behavioural challenges proactively (Zeicher & Liston, 2013). Through reflective teaching, teachers develop strategies for creating a positive learning environment conducive to student's engagement and success (Kanes & Gotch, 2020). It cultivates critical thinking skills among both educators and students (Brookfield, 1995). By examining their teaching practices and student response, teachers gain insights into the underlying assumptions and blases that influence their decision making processes (Rodgers, 2002). Moreover, teachers exposed to reflective teaching methods are more likely to engage in metacognitive processes and develop higher-order Reflective teaching would be discussed in three phases: Planning stage, teaching stage and debriefing stage.

Planning stage

The planning stage starts with the weekly plan. Teachers use weekly plains to gain an insight into the curriculum in their schools and where weekly plans are produced for each subject area, they tend to be quiet brief, pulling information from the relevant medium. Such plans are not a substitute for lesson plans rather, the intention is that they should give an overview of the teaching programme in a class for a given week (Pollard, 2006).

Classroom learning sessions are central activities for teachers and learners. When devising lesson plans, reflective teachers will consider long and medium term plans, their classroom organizational strategies (including the use of colleagues) and practical considerations (such as the time-tabling of the class) they will have some formative assessment information about their pupils so that specific objectives can be refined and differentiated, planning however can be seen in this way.

Evaluating teaching

Teaching plans and implementation should be open to modification and change, dependent upon their success in aiding the development of learning in the classroom. A reflective teacher is one who clearly understands the intimate links between the processes of planning, teaching and assessment. Thus, in considering the evaluation of lessons, it is possible to highlight many features.

Teaching stage

At the teaching stage, the teacher gets to the class and begins to implement all that she has planned. Observations are made through his/her mentor teacher and through audio/video coverage. In teaching the lesson, the teacher implements the questions, explanations and discussions that were developed recall and prepares to address anticipated student responses. Typically, plans are modified in the mist of teaching in response to actual student's ideas, interpretations and questions which inevitably vary from those anticipated when planning. The mentor teacher takes note of critical aspects of the lesson to be reviewed during the debriefing. Such observations include: the nature of student's questions.

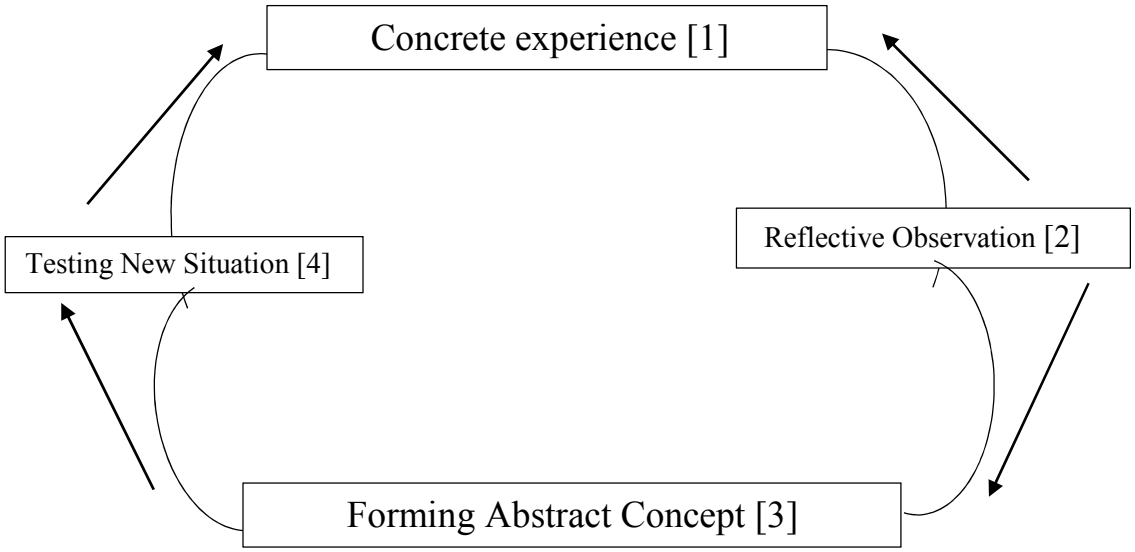
Debriefing stage

At this phase, the reflective teacher begins to think back on the experience of his teaching, his strength and weakness of the teaching is observed. Analysis is done based on the observation through either some of the following, mentor teacher or through the audio or video coverage etc. The teacher then makes decisions on what to do next if he comes across such or similar situation.

Modes of reflective teaching

Schon (1997) conceptualized the reflective practitioner as one who is systematic self assessing as he constantly gets feedback from the external assessment process and is most preoccupied with early identification of problems and proffering of solutions to them. Atkins, Murphy & Schon in Gibbs (2004) posited modes of reflection as; Reflection for action (before action), Reflection in action (during action), Reflection on action (after action).

Conceptual Framework



David Kolb's experiential learning model

The experiential learning cycle comprises four different stages of learning from experience and can be entered at any point, but all stages must be followed in sequence for successful learning to take place. The learning cycle suggests that it is not sufficient to have an experience in order to learn. It is necessary to reflect on the experience to make generalizations and formulate concepts which can then be applied to new situations. This learning must then be tested out in new situations. The learner must make a link between the theory and action by planning, acting out, reflecting and relating it back to the theory.

Experiential learning relates solely to the meaning making process of the individual's direct experience. However, through the gaining of knowledge, it is an inherent process that occurs naturally, for a genuine learning experience to occur, there must exist certain elements. According to David Kolb, an American educational theorist, knowledge is continuously gained through both personal and environmental experiences. This model was adapted in this research

Skills that can be acquired through Kolb's Experimental Learning include:

1. Reflective observation: After the concrete experience, teachers reflect on and analyze what happened. Skills derived from this stage include:
- Critical thinking: Evaluating and experience and considering its implications.
- Analysis: Breaking down the experiences into its components and exploring underlying factors.
- Self-awareness: Recognizing personal reactions, thoughts and findings associated with the experience.
2. Abstract conceptualization: In this stage, learners make sense of the experiences by conceptualizing theories or principles skills derived from the stage include:
- Conceptual thinking: Formulating consents, theories, or models to explain the experience.
- Problem solving: Applying theoretical knowledge to understand and address challenges encountered in the experience.
- Synthesis: Integrating new information with existing knowledge frameworks.
3. Active experimentation: Learners apply what they have learned from the experience to new situations or context skills derived from this stage include:
- Adaptability: Adjusting strategies or approaches based on past experiences.
- Innovation: Generating new ideas or solutions based on insights regained from experimentation.
- Decision-making: Making informed decisions and taking action based on learned principles

METHODOLOGY

Two hundred (200) teachers were trained on reflective teaching pedagogy, experiential model was adopted (by Kolbs). Mode of reflection used was reflection on action (taking place in the classroom). Teachers were trained and observed during training using teacher's diary, recording of lesson, photography etc to gather information about what they were doing and collaboration was encouraged, after training, they were sent to the classroom for a whole term, seventeen (17) mentor teachers from 3 different fields (Chemistry, Biology, Physics) were also trained on what to observe and assess teachers for, using the reflective rating scale as adapted from Richard and Lockharts (1997;16) where we have guidelines on reflection, which focus on events that took place during a lesson. This was based on six variables which are lesson planning, implementation, evidence of pupil learning, evidence of teachers learning, reflectivity and professionalism. Each question has a minimum grade of 1 and maximum grade of 5 which was collated at the end of the term by the mentor teachers.

Research Design

This study is a descriptive quantitative research design. The sample for the study comprised of two hundred (200) teachers who were assessed by mentor teachers specially trained(both teachers and the mentor) They were assessed based on lesson planning, implementation, evidence of pupils' learning, evidence of teachers' learning and reflectivity ,which was constructed based on Richard and Lockhart (1997;16) titled ; Guidelines on Reflection, Questions which focus on events that took place during a lesson .Seventeen mentor teachers were used as assessors. Teachers were assessed every week at the end of the term the average was found. Purposive sampling technique was used to select the teachers for the study.

Research instrument

The reliability of the reflective rating scale instrument was ((ascertained by the use of test-retest method. The questionnaire (reflective rating scale) was administered twice within an interval of some weeks on 20 respondents who were not part of the study. The scores of the two sets of responses were collated and analyzed using Pearson Product Moment Correlation (PPMC). A reliability co-efficient of 0.83 was obtained which indicated that the instrument is adjudged reliable for the study.

. Also, univariate analysis (frequency table, percentages, mean and Standard Deviation) were used to analyze the quantitative data collected for the study. Information on the underlying distributional characteristics of each of the factors as contained in the reflective rating scale and various responses of the respondents were obtained through statistical package for social sciences (SPSS) software version 23.

Research questions

1. How does reflective teaching pedagogy impact on the lesson plan by teachers and their professional development in the classroom?
2. To what extent does reflective teaching pedagogy have direct impact on the implementation of teacher's skill and professional development in the classroom?
3. How does reflective teaching pedagogy have impact on the learning achievement of pupils in the classroom?
4. Does reflective teaching pedagogy have direct impact on the evidence of teachers learning and professional development in the classroom?
5. How does reflective teaching pedagogy impact on the reflective activities of pupils in the classroom?

Results and Discussion

This section presents the results of the study based on the data collected from the field to provide answers to research questions raised in the study.

Research Question 1

How does reflective teaching pedagogy impact on the lesson plan by teachers and their professional development in the classroom?

Table 1: Response to clarity of reflective teaching pedagogy and its impact on the lesson plan by teachers and their professional development in the classroom

S/N	ITEMS	Very Clear (%)	Clear (%)	Not Clear (%)	Mean	SD	Remark
1	Clear teaching objective	40 (20.0)	150 (75.0)	10 (5.0)	3.61	.656	Clear
2	Sequencing and progreyssion of activities	80 (40.0)	100 (50.0)	20 (10.0)	2.89	.934	Clear

3	Choice and adaptation of materials	60 (30.0)	60 (30.0)	80 (40.0)	2.94	.960	Clear
4	Design of tasks with respect to how much time was allocated to pupils	65 (32.5)	120 (60.0)	15 (7.5)	3.08	.907	Clear
5	Planning to meet individual needs	50 (25.0)	70 (35.0)	80 (40.0)	3.21	.835	Clear
6	Pupils centeredness	120 (60.0)	60 (30.0)	20 (10.0)	3.56	.761	Clear
7	Use of teaching aids	110 (55.0)	40 (20.0)	50 (25.0)	2.53	.831	Clear
8	Use of Information Technology	70 (35.0)	50 (25.0)	80 (40.0)	2.72	.738	Clear

Table 1 shows the statistical analysis of the clarity of reflective teaching pedagogy and its impact on the lesson plan by teachers and their professional development in the classroom with mean range of 2.53 – 3.61 and standard deviation range of .656 – .960. Analysis revealed that (95.0%) of the respondents agreed to the assertion that teaching objectives are very clear with the mean rate of 3.61, most of the respondents (90.0%) held that sequencing and adaptation of material is very clear with the mean rate of 2.89.

It was revealed that (60.0%) of the respondents held that choice and adaptation of materials is clear enough with the mean rate of 2.94; most of the respondents (92.5%) maintained that design of tasks with respect to how much time was allocated to pupils was very clear with the mean response rate of 3.08; majority of the respondents (60.0%) indicated that planning to meet individual needs of the pupils are very clear with the mean rate of 3.21; most of the respondents (90.0%) and (75.0%) respectively held that pupils centeredness and use of teaching aids are very clear with the mean response rate of 3.56 and 2.53, while it was held by most of the respondents (60.0%) that usage of information technology in planning lesson by the teachers is very clear as a direct impact of reflective teaching pedagogy

Research Question 2

To what extent does reflective teaching pedagogy have direct impact on the implementation of teacher's skill and professional development in the classroom?

Table 2: Response to whether reflective teaching pedagogy have direct impact on the implementation of teacher's skill and professional development in the classroom

S/N	ITEMS	Agree (%)	Disagree (%)	Undecided (%)	Mean	SD	Remark
1	Has subject matter	140	40	20 (10.0)	3.11	.716	Agreed

	knowledge	(70.0)	(20.0)				
2	Clarity of the subject matter	140 (70.0)	50 (25.0)	10 (5.0)	3.09	.911	Agreed
3	Accuracy of delivery	140 (70.0)	40 (20.0)	20 (10.0)	2.97	.720	Agreed
4	Classroom language	150 (75.0)	30 (15.0)	20 (10.0)	3.18	.817	Agreed
5	Questioning skills	160 (80.0)	20 (10.0)	20 (10.0)	2.98	.927	Agreed
6	Accurate explanation	100 (50.0)	80 (40.0)	20 (10.0)	3.04	.816	Agreed
7	Feedback from pupils	120 (60.0)	70 (35.0)	10 (5.0)	2.76	.837	Agreed
8	Class control	140 (70.0)	50 (25.0)	10 (5.0)	2.81	.931	Agreed

Table 2 shows the statistical analysis of the impact of reflective teaching pedagogy on the implementation of teacher's skill and professional development in the classroom with mean range of 2.76 – 3.18 and standard deviation range of .716 – .931. Analysis revealed that (90.0%) of the respondents agreed that teachers has subject matter knowledge with the mean rate of 3.11, while (10.0%) of the respondents held contrary perception. Virtually all the respondents (95.0%) held that there was clarity of the subject matter with the mean rate of 3.09.

It was further revealed respectively that (90.0%) of the respondents equally held that accuracy of delivery, classroom language, questioning skills and accurate explanation by the teachers were concise and reflective of the subject matter with mean response rates of 2.97, 3.18, 2.98 and 3.04 respectively, while (95.0%) of the respondents extolled teacher's skills in the area of feedback from pupils and class control with mean response rate of 2.76 and 2.81 respectively.

Research Question 3

How does reflective teaching pedagogy have impact on the learning achievement of pupils in the classroom?

Table 3: Response to whether reflective teaching pedagogy have impact on the learning achievement of pupils in the classroom

S/N	ITEMS	Very Clear (%)	Clear (%)	Not Clear (%)	Mean	SD	Remark
1	Achievement of learning (aims and objectives)	90 (45.0)	70 (35.0)	40 (20.0)	3.19	.704	Clear
2	Classroom responses	80 (40.0)	100 (50.0)	20 (10.0)	2.77	.877	Clear
3	Pupils' participation	80 (40.0)	90 (45.0)	30 (15.0)	2.99	.901	Clear
4	Pupils' motivation	50 (25.0)	100 (50.0)	50 (25.0)	3.31	.802	Clear
5	Quality of pupils class tasks	100 (50.0)	60 (30.0)	40 (20.0)	3.03	.891	Clear
6	Quality of homework	70 (35.0)	100 50.0)	30 (15.0)	2.89	.817	Clear

Table 3 shows the statistical analysis of whether reflective teaching pedagogy have impact on the learning achievement of pupils in the classroom with mean range of 2.77 – 3.31 and standard deviation range of .704 – .901. Analysis revealed that (80.0%) of the respondents indicated that achievement of learning aims and objectives were clear with the mean rate of 3.19, while (20.0%) of the respondents held contrary perception. Most of the respondents (90.0%) held that classroom responses were clear and audible with the mean rate of 2.77.

It was further revealed that most of the respondents (85.0%) and (75.0%) held that class participation and pupils' motivation were clear enough with the mean rate of 2.99 and 3.31 respectively; most of the respondents (92.5%) maintained that design of tasks with respect to how much time was allocated to pupils was very clear with the mean response rate of 3.08. Majority of the respondents (80.0%) indicated that quality of pupil class tasks were very efficient and clear with the mean rate of 3.03 while it was held by most of the respondents (85.0%) that quality of home work for the pupils is very efficient and clear as a direct impact of reflective teaching pedagogy with the mean rate of 2.89.

Research Question 4

Does reflective teaching pedagogy have direct impact on the evidence of teachers learning and professional development in the classroom?

Table 4: Response to whether reflective teaching pedagogy have direct impact on the evidence of teachers learning and professional development in the classroom

S/N	ITEMS	Yes (%)	No (%)	Mean	SD	Remark
1	Improvement on the subject matter area	160 (80.0)	40 (20.0)	3.10	.710	Agreed
2	Development of teacher's presence	170 (85.0)	30 (15.0)	3.11	.917	Agreed
3	Response to pupils' task	180 (90.0)	20 (10.0)	2.90	.721	Agreed
4	Formation of teacher's identity in the classroom	170 (85.0)	30 (15.0)	2.89	.717	Agreed
5	Maintenance of discipline	160 (80.0)	40 (20.0)	2.91	.827	Agreed
6	Ability to implement changes	180 (90.0)	20 (10.0)	3.02	.886	Agreed
7	Development of assessment	160 (80.0)	40 (20.0)	2.66	.807	Agreed
8	Record keeping of test and examinations	170 (85.0)	30 (15.0)	2.87	.781	Agreed

Table 4 shows the statistical analysis of whether reflective teaching pedagogy have direct impact on the evidence of teachers learning and professional development in the classroom with mean range of 2.66 – 3.11 and standard deviation range of .717 – .917. Analysis revealed that (80.0%) of the respondents indicated that there was an improvement on the subject matter area by the teachers with the mean rate of 3.10, while (20.0%) of the respondents held contrary perception. Most of the respondents (85.0%) held that the development of teacher's presence was effective with the mean rate of 3.11.

It was further revealed that most of the respondents (90.0%) and (85.0%) held that response to pupils' task and formation of teacher's identity in the classroom was impactful with the mean rate of 2.90 and 2.89 respectively; most of the respondents (80.0%) and (90.0%) maintained that maintenance of discipline and ability to implement changes was very effective with the mean response rate of 2.91 and 3.02 respectively. Majority of the respondents (80.0%) indicated that the development of assessment was very impactful with the mean rate of 2.66 while it was held by most of the respondents (85.0%) that record keeping of test and examination was impactful as a direct impact of reflective teaching pedagogy with the mean rate of 2.87.

Research Question 5

How does reflective teaching pedagogy impact on the reflective activities of pupils in the classroom?

Table 5: Response to whether reflective teaching pedagogy have impact on the reflective activities of pupils in the classroom

S/N	ITEMS	Agree (%)	Disagree (%)	Undecided (%)	Mean	SD	Remark
1	Ability to pinpoint strength	120 (60.0)	40 (20.0)	40 (20.0)	2.99	.714	Agree
2	Ability to identify the effects of teaching strategies on pupils	105 (52.5)	50 (25.0)	45 (22.5)	2.81	.817	Agree
3	Ability to suggest alternative practice	70 (35.0)	80 (40.0)	50 (25.0)	3.58	.981	Agree
4	Ability to learn and develop through reflective teaching	120 (60.0)	30 (15.0)	50 (25.0)	3.01	.832	Agree

Table 5 shows the statistical analysis on reflective teaching pedagogy impact on the reflective activities of pupils in the classroom with mean range of 2.81 – 3.58 and standard deviation range of .714 – .981. Analysis revealed that (80.0%) of the respondents indicated that teachers were able to easily pinpoint strength in the pupils with the mean rate of 2.99, while the remaining (20.0%) of the respondents held contrary perception.

It was further revealed that most of the respondents (77.5%) and (75.0%) held that ability to identify the effects of teaching strategies on pupils and ability to suggest alternative practices by the teachers were made impactful through reflective teaching strategy with the mean rate of 2.81 and 3.58 respectively while most of the respondents (75.0%) maintained that ability to learn and develop is possible through reflective teaching with the mean rate of 3.01.

Discussion of Findings

The study investigated the reflective teaching pedagogy: an innovative approach to the promotion of classroom science teacher skills and professional development. Five (5) research questions were answered descriptively.

The descriptive analysis of the study revealed that reflective teaching pedagogy had impact on the lesson plan by teachers and their professional development in the classroom as teaching objective, sequencing and progression of activities, choice and adaptation of materials, design of tasks, planning to meet individual needs, pupil centeredness, usage of teaching aids and the use of information technology were done and prepared with clarity. This research is in support of the work of Ojanen (2002), Hine (2000), Ogunbameru & Uwameiye (2012), Ostroga (2006), Fredius (2002), Boris (2019).

It was further revealed that reflective teaching pedagogy have direct impact on the implementation of teacher's skill and professional development in the classroom as most teachers displayed deep knowledge and clarity of subject matter, accuracy of delivery, classroom language,

questioning skills, accurate explanation, feedback from pupils and class control were all direct impact of reflective teaching pedagogy.

The descriptive analysis of the study also revealed that reflective teaching pedagogy had impact on the learning achievement of pupils in the classroom as achievement of learning aims and objectives, classroom responses, pupils' participation and motivation, quality of pupils' class tasks and homework were the reflections of the reflective teaching pedagogy.

Penultimate, the study revealed that reflective teaching pedagogy had impact on the evidence of teachers learning and professional development in the classroom. It was shown that improvement on the subject matter area by the teachers, development of teacher's presence, response to pupils' task, formation of teacher's identity in the classroom, maintenance of discipline, ability to implement changes, development of assessment and adequate record keeping of test and examination by the teachers are direct impact of reflective teaching pedagogy.

Lastly, the descriptive analysis of the study revealed that reflective teaching pedagogy impact on the reflective activities of pupils in the classroom, such as ability to pinpoint strength, identify the effects of teaching strategies on pupils, suggest alternative practice and ability to learn and develop through reflective teaching.

Conclusion and Recommendation

This study provides an important finding on the reflective teaching pedagogy: an innovative approach to the promotion of classroom science teacher skills and professional development. It was found that reflective teaching pedagogy had impact on the teacher's lesson planning, implementation, pupil's learning outcome, evidence of teachers' learning and reflective activities. Reflection helps teachers assimilate what they do on a daily basis and accommodate their teaching instructions into new classroom practices. Based on the findings of this study, it was recommended that the application of the reflective teaching approach in teaching should be made compulsory at elementary level of educational institution and that curriculum developers, the federal and state government; other professional bodies like the Science Teachers Association should create resource centers that can sensitize other stakeholders in the education sector on the efficacy of reflective teaching approach.

Ethic statement

Ethical clearance was collected from the Centre for Research and Development (CERAD), Bamidele Olumilua University of Education, Science and Technology, Ikere Ekiti (BOUESTI), to carry out the research project titled: Reflective teaching pedagogy; An innovative approach to the promotion of classroom science teacher skills and professional development.

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