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Impact of Reflective Teaching Strategy On Science Education Students Learning Outcomes in Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti. Ekiti State, Nigeria

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Abstract

The study examined the impact of reflective teaching strategy on science education students learning outcomes in Bamidele Olumilua University of Education, Science and Technology, Ikere- Ekiti. Ekiti State, Nigeria. Two research questions were raised to guide the study while two research hypotheses were formulated for the study. This study adopted a descriptive research design of the survey type. The population of the study comprised of 60 Science education Students in 300 level in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State. The sample for the study comprised of 40 science education students. Purposive sampling techniques was used to select 10 students in Biology, 10 students in Chemistry, 10 students in Physics, 5 students in Integrated Science and 5 students in Mathematics. The instrument used for the study was a self-constructed questionnaire on the impact of reflective teaching strategy on science education Students learning outcomes. The face and content validity of the instrument was done by experts in the field of Science Education, Test, Measurement and Evaluation. The reliability of the instrument was determined through test-retest method. The administration of the questionnaire was done by the researcher and a junior colleague who was trained as research assistant. Data collected and collated from the study were analysed using descriptive statistics of frequency counts, percentage and inferential statistics of chi-square. All hypotheses generated were tested at 0.05 level of significance. The findings of the study revealed

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that there is significant difference in enhancing Science education learning through the use of reflective teaching as a strategy. Also, there is a significant influence of introduction of reflective teaching on students' attitudes towards Science education. Based on the findings of the research it was concluded among others that reflective teaching strategy is therefore relevant in facilitating students' learning outcomes in science education.t was recommended based on the study among others that use of reflective teaching strategy in teaching science education in tertiary institutions motivate, stimulate and sustain students' learning outcomes in science education.

Keywords: reflection, teaching strategy, science education, teacher education, classroom interaction,

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Introduction

Reflective teaching involves sequences of interconnected ideas that take into consideration underlying beliefs and knowledge. School's actions became routine and needed to alter. Teaching as a profession comprised of assorted individuals with personally constructed understandings of what it's to be professional, to be an instructor and to be reflective. The implications for reflection on professional practice are obvious: individuals describe, analyze and plan some way to enhance in their own ways. This can be just because it permits teachers to start out from their own individual experiences and perspectives; consider these in their contextual variations and draw upon the theoretical, professional strategies that they need encountered or commit to explore. Being reflective requires an understanding of why certain actions appear within the way teachers teach, where knowledge-based foundations come from in their science skills. Teaching and learning process of Integrated Science should change and take a replacement dimension. It means reflection should involve quite an easy reflective session or training. consistent with Zalipour (2015), reflective teaching is for those teachers who are disposed to consider their teaching practices, and are willing to place reflective practice into action. Reflective practice challenges teachers who have unquestionable assumptions about good teaching, encourages them to look at themselves and their practices within the interest of continuous improvement. Teachers are impacted upon by increasing globalization and mobility therein they're mandated to accommodate the cultural, religious and societal differences that are presented in diverse classrooms (Clarence, 2011).

Dyson (2004), regarded reflective process as not the sole concerns that teachers face in their particular professional obligations which challenge them to reflect on how best to present content, select pedagogical strategies, understand student differences and therefore the accompanying parental, and community demands and expectations, redefined what it's to be an instructor within the contemporary world and even to reconsider their notions of basic constructs like the character of intelligence. According to Dewey (1933) as cited in Pedro (2006), reflection is taken into account as a thinking process, leading to creating alternatives to teaching. Teachers who don't reflect about their teaching often uncritically accept the everyday reality in their schools and concentrate much effort on finding the foremost effective and efficient means to unravel problems. Impedovo and Khatoon, (2016) reported that to be a reflective practitioner, an instructor can implement different strategies. They could, as an example, analyze and question happenings within the teaching-learning context; show consideration for feelings and behaviors; keep an everyday or daily record of serious events; share stories about students' learning; ask colleagues more about changing the environment and materials to support students' learning.

Consistent with Ahmad, (2013), "reflectivity is one amongst the characteristics of effective teachers". During this sense, reflection encourages science teachers to be more competent because they develop critical thinking and problem-solving skills that play an important role within the effectiveness of language education. Ditchburn (2015) asserted that "creating opportunities for pre-service teachers (PSTs) to critically reflect on and theorize about their practice is usually considered a vital component of professional experience". This quote suggests that science teachers need chances to research the way they need been teaching and see they are doing not should make a choice simply because an issue appears. Instead, there should be an action commit to uncover possible issues and to possess a second plan. In other words, teachers should implement continuous phases of reflection to spot what's occurring

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within the classroom as a chance to enhance their professional practices. It implies teachers' commitment to check their teaching practices to form changes supported weaknesses and develop action plans to enhance the standard of their education instruction. Reflection could be a process of rethinking and analyzing certain actions in school so students and teachers can reach their teaching and learning objectives (Zalipour, 2015).

MacKinnon's reflective cycle, which consisted of three phases: initial problem setting, reframing, and determination consistent with Tairab (2003), was derived from conception of reflection: framing and reframing. The previous contributions on reflective teaching enable teachers to research their actions within the sense of providing outcomes. Al-Issa and Al-Bulushi (2010) argue: "for reflection on teaching and learning to be effective, it's to be systematic and public (making one's teaching and work accessible for critical referee and use)". It means the incorporation of reflection should be a daily process, an important a part of the science teaching profession to determine effective changes within the classroom. The responsibility of teachers' actions regarding the results on students' learning process is taken into account an indispensable component to alter science teaching. It means the responsibility to supply high-quality instruction and understand students' attitudes towards their science learning performance could be a vital component so science, learners will feel more confident when trying to supply the science facts.

Reflective teaching strategies have to do with deliberate examination of how we teach and learn. It fits in the interpretive view of teaching and learning, a move towards critical thinking of the way we teach and learn. It is a kind of teaching strategy which has to be viewed in terms helpful for both the teacher and students to ascertain productivity in teaching and students' learning process. In this extent reflective teaching is a call to let know how to combine theory and practice to maintain and sustain standard teaching profession (Gatumu, 2016).

Reflective teaching means looking at what you do in the classroom and giving it a meaning of attaching the why question to what you go through. Pollard in Gatumu (2016) regard reflective teaching strategy as cyclic process by which teacher interprets his/her classroom practice. Reflective teaching enable teacher to from the known to the unknown by making use of recalled experiences in a critical manner. Reflective teaching is a deliberate move to allow you think critically of your teaching practice so that your students can maximize their learning.

Reflective teaching is a mark of a concerned teacher who is skilled enough to examine his/her beliefs, values and assumptions behind the teaching practice. Bailey (2013) stated that reflective teaching is 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 means of conducting your own ongoing professional life by solving problems in a systematic manner (Gatumu 2016).

Tairab (2003) opined that "reflection is characterized by the character of reframing which occurred over the teaching practice period". According to Tairab (2003), "reflection was found to be characterized by the character of reframing, while Soisangwarn and Wongwanich (2014) argued that "reflective teaching is effective for professional teacher development therein it encourages the teacher to appear at ways of managing the classroom and kids from differing perspectives. From that perspective, reflective science teachers develop their teaching by doing research to collect important data about their teaching; it's evident that science teachers don't make the policies but they need the commitment to contribute to their

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professions. It implies that a good professional development practice should take into consideration the important teachers' needs further as learners' interest and context. From the study of Christodoulou (2010) who reflected on his teaching in an exceedingly systematic way to: (a) see whether systematic self-reflection will reveal the foremost problematic areas in teaching and (b) compare and analyze the advantages and downsides. Self-reflection also is a very important component of reflection on the teaching of Integrated Science as key aspect of recent science.

To become a reflective teacher, Saylag (2012) highlights the importance of private beliefs and experiences that contribute to critical reflection because the distinguishing attribute of reflective practitioners; therein sense, personal beliefs and experiences was to be at the core of the method of reflection which, in turn, would serve to boost teaching and academic skills. Hence, this study intends to examine reflective teaching as an approach to improve Integrated Science teaching among College of Education students in Ikere, Ekiti State, Nigeria.

Recently reports on Colleges of Education integrated science students indicated steady trend of low academic achievement. This is of serious concern not only to lecturers of courses being taught, but also to school authorities and other significant stakeholders such as parents and government among others. This raises serious question on the effectiveness of the instructional methods and strategies used by lecturers of integrated science in the college of education, Ikere-Ekiti. Indeed, the teaching of integrated science just like similar courses is being done with the use of lecture method. In a situation where the students are passive during the lesson, a method which may not likely challenge students to be actively involved in teaching/learning activities cannot cause students to reflect on what they have learnt. This situation justifies the present attempt in this study to use the reflective teaching strategy in teaching integrated science at the college of education. Thus, the study is to examine the impact of reflective teaching strategy on science education students learning outcomes in Bamidele Olumilua University of Education, Science and Technology, Ikere- Ekiti. Ekiti State, Nigeria.

The study specifically:

1. examine the impact of reflective teaching strategy on the performance of science education students;
2. determine impact of reflective teaching strategy on attitude of science education students.

Research Questions

The following research questions were raised to guide the study:

1. What is the impact of reflective teaching strategy on the performance of science education students?
2. What is the impact of reflective teaching strategy on attitude of science education students?

Research Hypotheses

The following research hypotheses were generated for the study:

1. There is no significant impact of reflective teaching strategy on the performance of science education students in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State.

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2. There is no significant impact of reflective teaching strategy on students' attitudes towards Science education in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State.

Methodology

This study adopted a descriptive research design of the survey type. It enabled the researcher to investigate the impact of reflective teaching strategy on Students' Learning Outcomes in Science Education in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State. The population of the study comprised of 60 Science education students in 300 level in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State. The sample for the study comprised of 40 science education students. Purposive sampling techniques was used to select 10 students in Biology, 10 students in Chemistry, 10 students in Physics, 5 students in Integrated Science and 5 students in Mathematics.

The instrument used for the study was a self-constructed questionnaire on the impact of reflective teaching strategy on science education Students learning outcomes. The questionnaire was made up of two sections, A and B. Section A was used to elicit information on the bio- data of the respondents which included sex, age, and part. Section B elicited information on the study. It was 15-items questionnaire, modified four Point Likert-type rating scale of types; Strongly Agreed, Agreed, Disagreed and Strongly Disagreed. The face and content validity of the instrument was done by experts in the field of Science Education, Test, Measurement and Evaluation. The reliability of the instrument was determined through test-retest method. Fifteen science education students that were not used for the study was used; the instrument was administered twice on the same set of respondents within an interval of two weeks. The two sets of data collected were analyzed using Pearson Product Moment Correlation (PPMC) and 0.82 was obtained which was regarded high enough for the reliability.

Hence, the instrument was adjudged to be reliable and adequate for the study. The administration of the questionnaire was done by the researcher and a junior colleague who was trained as research assistant. The researcher and the research assistant distributed the questionnaire to the respondents and completed questionnaire were collected immediately. Research questions raised were analyzed using descriptive statistics of frequency counts, percentage and Hypotheses formulated were test using inferential statistics of chi-square. All hypotheses generated were tested at 0.05 level of significance.

Results

Descriptive Analysis

Table 1: Distribution of respondents based on gender

Sex	Frequency	Percentage
Male	18	45.0%
Female	22	55.0%
Total	40	100%

Table 1 revealed that 18 which represented (45.0%) of the respondents are male while the remaining 22 which represented (55.0%) are female.

Research Question 1: What is the impact of reflective teaching strategy on the performance of science education students?

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Table 2: Responses to impact of reflective teaching strategy on the performance of science education students

S/N	ITEMS	SA (%)	A (%)	D (%)	SD (%)	Mean	SD
1.	The use of reflective teaching in science education improves students' performance.	20 (50.0)	10 (25.0)	5 (12.5)	5 (12.5)	1.83	.988
2.	It is easy to learn science education using reflective teaching.	17 (42.5)	9 (22.5)	7 (17.5)	7 (17.5)	1.86	.927
3.	Learning science education with reflective teaching gives room for critical thinking among students.	16 (40.0)	9 (22.5)	9 (22.5)	6 (15.0)	1.49	.721
4.	Teaching and learning of science education using reflective teaching enhances the students' understanding of the concept.	13 (32.5)	13 (32.5)	9 (22.5)	5 (12.5)	1.61	.776
5.	Reflective teaching strategy makes learning of science education more practical and real.	14 (35.0)	8 (20.0)	11 (27.5)	7 (17.5)	1.83	.988
	Total Average (%)	**16 (40.0)**	**9.8 (24.5)**	**8.2 (20.5)**	**6 (15.0)**		

Table 2 showed the mean and standard deviation scores of items 1 to 5 regarding the responses to the enhancement of reflective teaching strategy on students' performance in Science Education. The table showed the mean scores ranging from 1.49 – 1.86 and standard deviation values (.721 - .988). Analysis of statement revealed that (75.0%) of the respondents agreed that the use of reflective teaching in Science Education improves students' performance. while the remaining (25.0%) of the respondents expressed contrary opinion.

It was also observed from the table that majority of the respondents (65.0%) also agreed that it is easy to learn Science Education using reflective teaching. while (35.0%) disagree to this assertion. The table equally revealed that (62.5%) of the respondents agreed to the assertion that learning Science Education with reflective teaching gives room for critical thinking among students. while (37.5%) of the respondents does not support the opinion.

Also, the table indicated that majority of the respondents (65.0%) agreed that teaching and learning of Science Education using reflective teaching enhances the students' understanding of the concept. while the remaining (35.0%) expressed contrary opinion. Lastly, it was revealed by the table that (55.0%) of the respondents believed that reflective teaching strategy makes learning of Science Education more practical and real. while (45.0%) of the respondents disagreed to the assertion.

Summarily, the analysis revealed that reflective teaching enhances students' performance in Science Education since total average of (64.5%) of the respondent agreed to the assertion.

Research Question 2: What is the impact of reflective teaching strategy on attitude of science education students?

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Table 3: Responses to impact of reflective teaching strategy on attitude of science education students

S/N	ITEMS	SA (%)	A (%)	D (%)	SD (%)	Mean	SD
1.	Using reflective teaching to teach science education makes students to have positive attitudes towards Integrated Science.	20 (50.0)	7 (17.5)	6 (15.0)	7 (17.5)	1.74	.863
2.	Learning science education with reflective teaching improves students' performance in Integrated Science.	12 (30.0)	14 (35.0)	7 (17.5)	7 (17.5)	1.64	.771
3.	Learning with reflective teaching is a quicker way of getting feedback of science education.	19 (47.5)	8 (20.0)	8 (20.0)	5 (12.5)	1.78	.911
4.	Using reflective teaching is effective for learning science education.	11 (27.5)	15 (37.5)	6 (15.0)	8 (20.0)	1.81	.825
5.	Reflective teaching assists students to eagerly learn science education.	17 (42.5)	15 (37.5)	2 (5.0)	6 (15.0)	1.72	.910
	Total Average (%)	**15.8 (39.5)**	**11.8 (29.5)**	**6 (15.0)**	**6.6 (16.0)**		

Table 3 showed the mean and standard deviation scores of items 1 to 5 regarding the responses to the responses to the influence of reflective teaching strategy on students' attitudes towards science education. The table showed the mean scores ranging from 1.64 – 1.81 and standard deviation values (.771 - .863). Analysis of statement revealed that (67.5%) of the respondents agreed that using reflective teaching to teach science education makes students to have positive attitudes towards science education. while the remaining (32.5%) of the respondents expressed contrary opinion. It was also observed from the table that majority of the respondents (65.0%) also agreed that learning science education with reflective teaching improves students' performance in science education while (35.0%) disagree to this assertion.

The table equally revealed that (67.5%) of the respondents agreed to the assertion that learning with reflective teaching is a quicker way of getting feedback of science education while (32.5%) of the respondents does not support the opinion. It was also observed from the table that majority of the respondents (65.0%) also agreed that using reflective teaching is effective for learning science education while (35.0%) disagree to this assertion. Lastly, it was revealed by the table that (80.0%) of the respondents believed that reflective teaching assists students to eagerly learn science education. while (20.0%) of the respondents disagreed to the assertion. Summarily, the analysis revealed that use of reflective teaching strategy impact students' attitudes towards learning science education since (69.0%) of the respondents agreed to the assertion.

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Hypotheses Testing

Research Hypothesis 1: There is no significant impact of reflective teaching strategy on the performance of science education students in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State.

Table 4: Chi-square analysis of impact of reflective teaching strategy on the performance of science education students

S/N	ITEMS	SA	A	SD	D	Total
1.	The use of reflective teaching in science education improves students' performance.	20	10	5	5	40
2.	It is easy to learn science education using reflective teaching.	17	9	7	7	40
3.	Learning science education with reflective teaching gives room for critical thinking among students.	16	9	9	6	40
4.	Teaching and learning of science education using reflective teaching enhances the students' understanding of the concept.	13	13	9	5	40
5.	Reflective teaching strategy makes learning of science education more practical and real.	14	8	11	7	40
	Total	**80**	**49**	**41**	**30**	**200**

Significant at p≤.05 level (df = 12; Calculated value of X^2 = 32.15; Critical X^2 =16.92)

Decision rule: It could be observed from the analysis in *Table 4* that the calculated value of X^2 is 32.15 whereas the critical value at 0.05 level of significance and 12 degrees of freedom is 16.92, showing that the calculated value is greater than the critical value. In view of this, the null hypothesis was rejected. This implies that there is significant difference in enhancing Science education learning through the use of reflective teaching as a strategy.

Research Hypothesis 2: There is no significant impact of reflective teaching strategy on students' attitudes towards Science education in Bamidele Olumilua University of Education, Science and Technology, Ikere, Ekiti State.

Table 5: Chi-square analysis of impact of reflective teaching strategy on students' attitudes towards science education

S/N	Item	SA	A	SD	D	Total
1.	Using reflective teaching to teach science education makes students to have positive attitudes towards science education.	20	7	6	7	40
2.	Learning science education with reflective teaching improves students' performance in science education.	12	14	7	7	40
3.	Learning with reflective teaching is a quicker way of getting feedback of science education.	19	8	8	5	40
4.	Using reflective teaching is effective for learning science education.	11	15	6	8	40
5.	Reflective teaching assists students to eagerly learn science education.	17	15	2	6	40
	Total	**79**	**59**	**30**	**33**	**200**

Significant at p≤.05 level (df = 12; Calculated value of X^2 = 31.54; Critical X^2 =16.92)

Decision rule: It could be observed from the analysis in *Table 5* that the calculated value of X^2 is 35.14 whereas the critical value at 0.05 level of significance and 9 degrees of freedom is 16.92, showing that the calculated value is greater than the critical value. In view of this, the null hypothesis was rejected. This implies that there is a significant influence of introduction of reflective teaching on students' attitudes towards Science education.

Discussion

The descriptive analysis of the study revealed that reflective teaching enhances students' performance in science education. The analysis also revealed that introduction of reflective teaching influences students' attitudes towards learning science education. The findings of the study revealed that there is significant difference in enhancing Science education learning through the use of reflective teaching as a strategy. This is in line with findings with Brunnel, (2012) pointed out that practicing reflective teaching influence science learning in tertiary institutions. Reflective teaching is extremely valuable as a stance, a state of mind, a healthy, questioning attitude toward the practice of our profession. Maxwell, (2012) also confirms that reflective teaching strategy promotes pedagogical dialogue among students and it helps to clarify students' thinking. Correspondingly, the aim of professional development is focused on the improvement of teachers' actions to have effective outcomes of science education learners; it means if science learners are conscious of an effective science education bearing in mind how learners learn; the results would easily be seen in the classroom.

Results of hypothesis two revealed that there is a significant impact of reflective teaching strategy on students' attitudes towards Science education. This is in tandem with Smiths (2012), who claims that reflective teaching promotes active and viable professional development for science teachers. Thus, it is good to provide science lecturers with a pertinent professional development where their real needs, and reflection of the actions taken will be heard. Kingsley (2013) affirms that there is a need for new forms of impacting knowledge such reflective teaching strategy, by educational instructors that respond to the requirements of different teachers, teacher educators, and methodologies because the available ones are not fully sensitive to our educational needs.

Conclusion

Based on the findings of the research, it was concluded that reflective teaching strategy is therefore relevant in improving students' learning outcomes in science education. It means that a climate conducive to reflection should be developed through encouraging students to complete these reflective tasks for learning purposes, as they are being asked to write about what they know and do not know. To become reflective, teachers should be heard and their ideas and contributions must be considered within the educative context. Reflection helps teachers assimilate what they do on a daily basis and accommodate their teaching instructions into new classroom practices. Reflective teaching attained through professional development programs has been taken as a way to improve the professional practices of science teachers who regard professional development as a way to innovate, update their pedagogy and change their actions.

Recommendations

Based on the findings of the study, the researcher recommends the application of reflective teaching strategy in teaching science education in tertiary institutions. This will invariably motivate, stimulate and sustain students' interest in science education. Local, State and

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Federal Governments should encourage and sponsor in- service trainings, workshops and seminars so as to inculcate the rudiments of reflective teaching strategy in teaching science education.

In addition the government, in conjunction with 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.

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