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Investigating principals' roles in stem teachers' effectiveness

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Abstract

This study aimed to assess the impact of principals' role on STEM teachers' effectiveness among public senior secondary school teachers in the southern region of Nigeria. The research was guided by four key objectives: to evaluate the influence of principals' supervisory practices on teacher effectiveness, to examine the impact of principals' communication practices on teacher effectiveness, to investigate the correlation between principals' involvement of teachers in decision-making and teacher effectiveness, and to determine the overall level of teaching effectiveness among the teachers in the area. An ex-post-facto research design utilizing correlational and descriptive methods was employed, with data collected from 180 teachers selected through simple random sampling from a population of 328 teachers in public secondary schools in the southern region of Nigeria. The Principals' Role in Teacher Effectiveness Questionnaire (PRTEQ) was used for data collection. The findings revealed a significant relationship between the quality of supervisory practices provided by principals and teacher effectiveness, a significant correlation between principals' communication practices and increased teacher effectiveness, and a significant relationship between principals' involvement of teachers in decision-making and their effectiveness. Additionally, the study found a high level of teaching effectiveness among the teachers in the area. Based on these findings, it is recommended that principals enhance their supervisory practices, communication, and involvement in decision-making to further improve teacher effectiveness in public secondary schools.

Keywords: STEM education; principal leadership; teacher effectiveness; instructional supervision; secondary education

1. Introduction

Quality teaching is the primary task of every teacher in the school system. Teachers are the backbone of any educational system. The success and failure of any educational system to a large extent depend on the effectiveness of teachers during the teaching and learning processes (Ikegbusi & Eziamaka, 2016). As such, teachers' job effectiveness is an essential tool that would facilitate the actualization of educational goals and objectives in the secondary school system. The ability of teachers to undertake their teaching responsibilities effectively determines the extent to which secondary schools would achieve their goals and objectives. This is so because the entire job of pedagogy and the attainment of secondary educational goals rest on the shoulders of teachers.

Teacher effectiveness is the ability of a teacher to combine skillfully in a given situation, the right behavior towards the achievement of school objectives. An effective teacher is always abreast of the various teaching techniques required to improve the academic achievement of students (Bakwaph & Anyanwu, 2020). An effective teacher performs both the curricular and extracurricular activities conscientiously and diligently.

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Today's modern education requires a modern teacher in the same process. The emphasis is not placed only on the curriculum and what should be taught, but the effective moment holds a significant place. The way the teacher manages the classroom, provides a climate in the classroom, relations of entities actively participate in the educational process, etc. A thing that is truly appreciated today is the effectiveness of the teacher and his ability to be a good leader. The effectiveness of a teacher in any given school lies in the administrative role of the principal.

Teachers' effectiveness is reflected on students' results, teaching and learning in the classroom that advances the students' academic performance. The aims and objectives of secondary education make it clear that the future of any nation depends quite considerably on the quality of education it provides for its citizens. To achieve these aims and objectives of the education system, effective application of principal's administrative roles in the management of secondary schools becomes a necessity that should be considered (Bakwaph & Anyanwu, 2020). The concern of a principal in secondary school is to direct the activities of teachers, students and other staff in the school towards the school objectives by performing the roles of supervision, planning, motivation and evaluation.

Supervision is necessary in order to ensure that the set standards in schools are followed with the aim of attaining and sustaining school objectives to produce a meaningful impact on the teachers, students and the society at large. However, teachers may not undertake their jobs effectively without the principals performing their administrative roles effectively. Teachers in secondary schools are expected to prepare lesson notes, teach and evaluate students' performance during and at the end of term. The extent to which teachers carry-out these functions depends on how effective principals perform their administrative roles efficiently (Ikegbusi & Eziamaka, 2016). Instructional supervision is the systematic analysis of information during implementation of a programs to ensure that employees follow the laid down principles, policies and procedures in executing a given task. A principal as an instructional administrator is responsible for maintaining and improving the quality of instructional programs for effective and efficient attainment of the set objectives of a school.

This research aims to delve into this complex symphony, focusing on public secondary schools in the southern region of Nigeria and investigating the extent to which principal leadership practices influence teacher effectiveness.

1.1. Research Questions

- What is the impact of principals' supervisory role on teacher effectiveness in public senior secondary school teachers in southern Nigeria?
- What is the influence of principals' effective communication role on teacher effectiveness in public senior secondary school teachers in southern Nigeria?

1.2. Research Hypotheses

There is no significant relationship between the quality of supervisory practices provided by principals and the effectiveness of teachers in southern Nigeria.

No significant relationship exists between principal communication practices implemented by principals and increased teacher effectiveness in southern Nigeria.

The investigation into the role of principals in teacher effectiveness within public secondary schools in southern Nigeria holds significant importance for various stakeholders in the education sector, policymakers, educators, and the broader community. The comprehensive understanding derived from this study is expected to contribute significantly to educational practices, policy formulation, and the improvement of overall educational outcomes.

2. Literature Review

According to Muraina (2014), supervision can be seen as "a process which is dynamic and on-gong in outlook towards realizing the creative ability of children, teacher and the group of people for the expansion of the greatest possible educational programs". The supervisory skills of principals should improve teachers' rating, assist teachers in using various measures of self-evaluation and to a large extent make the principal to provide an environment that is conducive for effective teaching/learning activities.

The Federal Republic of Nigeria (2013) identified management of curriculum and instruction, supervision of classroom instruction, monitoring and evaluating students' progress and achievement, promoting and enhancing the learning environment, establishing and supporting continuous staff development and procuring instructional materials for

teaching and learning as major supervisory functions of secondary school principals. The educational policy also makes it clear that one of the cardinal objectives of administration in education is to ensure quality control through regular and continuous supervision of instruction and other educational services. Supervisory climate is an overseeing, directing workers also serves as a collaborative effort of the institution in order to achieve set goal and objectives designed in order to improve the teaching-learning process.

According to Modebelu (2008) supervisory climate is the process of assisting, directing, stimulating and motivating teachers to enhance teaching and learning process in educational institutions. Ogbo (2015) defined supervision as the maximum development of the teacher into the most efficient and effective person capable of becoming an effective teacher in all academic endeavors. This definition recognizes that a teacher has potentials that needed guidance and direction and become effective in the classroom. Clemen (2016) and Wang et al. (1993) stated that supervision is a task of improving instruction through regular monitoring/inspection and in-service education of teachers.

Eya and Leonard (2012) indicated that supervision is all about promoting leadership and teacher growth in educational practices. Olorunfemi (2008) and Okobia (2015) affirmed that supervision is a helping relationship whereby the supervisor guides and assists the teachers to meet the set educational goal and objectives. This described instructional supervision from the point of establishing the relationship with stakeholders in the school system for the purpose of achieving the set educational goal and objectives. All the various levels of education (early childhood, primary, primary/basic, post primary, and tertiary), must be properly supervised, managed in order to produce vibrant outputs (students) that will contribute effectively towards national development. This in essence will include attainment of a high level of academic excellence which entails the inculcation of the right type of knowledge, skills, values and attitudes of the learner to enable him to function efficiently and effectively within the society and ensure societal survival (Oyedeki, 2012).

Oyewole et al. (2014) asserted that, instructional supervision is the interaction between supervisor and the tutor to effectuate the quality of instruction. Instructional supervision implies the analysis of the behavior and teachers' antecedent factors of the two groups in the interaction process and proposition which seek to explain the interaction process itself. This interaction process involves the supervisor who happens to be a professional superior and a professional teacher who is a subordinate.

The behavior of the supervisor in his relationship with the teacher is assumed to be one of the significant factors on the teachers' effectiveness. Oyewole et al. (2014) described instructional supervision as a process of improving instruction for the benefit of students. He noted that instructional supervision helps the students to learn as effectively and efficiently as possible where teaching and learning are complementary processes. Supervision of instruction is required to guide teachers to be able to combine relevant input for enhancement of the teaching- learning process. The fact remains that the success of an educational program, especially in the achievement of effective learning depends largely on the effectiveness of the teachers. Uduak and Bassey (2015) stated that teachers constitute a very vital component despite the remarkable advancement in technology in all areas of teaching and learning process through the production of instructional materials such as television, computer projector of various kinds, the teacher is still an indispensably significant factor for motivating and imparting knowledge to the learners at each level of education. The extent to which teachers achieve this important role of imparting knowledge is contingent on their effectiveness. Uduak and Bassey (2015) Teachers' effectiveness involves all the activities carried out by the teacher to achieve the desired goal and objectives: making notes, classroom leadership, lesson, planning, and updates of school records.

Mecgley (2015) stated that, the major function of the supervisor is to assist others to become efficient and effective in the performance of the assigned duties. Teachers cannot effectively and efficiently execute the duties of teaching without themselves being properly and adequately supervised and monitored in school in order to bring out the best. Kotirde (2014) stressed that Supervisors are for improving educational program which helps teachers to achieve both qualitative and quantitative instructional delivery. It is also an indispensable variable in the teaching learning process in order to achieve overall school and educational objectives. However, problems of parents and inadequate funding of schools constitute lots of crises in the system. Kotirde (2014) further stated that the elements of supervisory roles of principals are defining the school mission, managing the curriculum and instruction, supervising teaching, monitoring learner progress and promoting the entire school progress. Ogba and Igu (2014) stressed that supervision has been identified as one of the approaches to teacher effectiveness. This calls for supervision of instructional procedure in secondary schools. Oyedeki (2012) stressed that the functions of school supervisors is to make classroom visits, supervising heads of departments and teachers by checking their scheme of work and lesson notes, checkmating teachers' classroom attendance, checking absenteeism and rewarding hardworking teachers and punishing indolent ones by assigning administrative duties to them as means of encouraging to do the right things at the right time.

2.1. Concept of Principal Effective Communication

Communication as concept can be defined as an active process and a purposeful shared experience involving two or more people, one sending a message through written and non-written means which could be verbal (oral) or non-verbal means, (for example, use of facial expression) and the other actively receiving it (Ijaiya, 2002). Communication may be defined as the transfer of a message or information from one person to another or a group of people for common understanding (Canary, 2011). Akomolafe (2012) further stated that good communication and shared values are important elements in this relationship. Ideally, a principal should be able to create consensus among staff on rules and their enforcement. While Okoye (2014) saw communication as a life wire and main feature of human existence in all administrative endeavors, and education is not left out.

Any gap in communication results in administrative hiccups that may mar the goals of the organization. It could lead to distraction in human relationship, anarchy and total collapse of a system. Schools that successfully implemented a pilot program experienced distinct improvements in discipline. Teachers are seen as the foundation upon which the growth and development of the society depends. Tabotndip (2005) opined that the quality and effectiveness of every education system anywhere in the world is dependent on the competences, effectiveness, efficiencies and devotion of the teaching force.

A fact that is established is that adequate communication in the organization is very important, irrespective of the communication system being used (i.e. formal or informal). An important thing is that information that has been adequately transferred from one person to another has been understood by the receiver. According to Nakpodia (2010), it is a universal activity in one form or another between people at all times in their lives with the exception of a few religious orders. Within an organization it is formalized as social interaction and is measured by its total amount, its frequency, which initiates it, the degree of reciprocity and its directions, upwards, downwards or sideways, among the members. Good communication is also important in the school system for teacher effectiveness.

3. Methods

3.1. Research Design

An ex-post-facto research design using correlational and descriptive methods was employed for this study. This design was considered appropriate since the study collected data from respondents in order to assess the role of principals possessed by public secondary school principals in southern Nigeria. It also enables the researcher to determine the level of teaching effectiveness of public secondary school teachers in Delta State and investigate the relationship between principals' principals' roles and teaching effectiveness in secondary schools in Warri-South Local Government Area of Delta State.

3.2. Population of the Study

The population of this study includes 328 teachers from public secondary schools in Warri-South Local Government Area Delta State as obtained from the Ministry of Basic and Secondary Education, Asaba, Delta State

3.3. Sample Size

The sample size was chosen using Taro Yamane's (1967) statistical method, with a 5% error tolerance and a 95% degree of freedom. So, after being roughly rounded to the closest number, one hundred and eighty (180) copies of the questionnaire were given out to the responders. To guarantee a fair representation, each of the teachers that made up the sample size were chosen at random.

3.4. Research Instrument

The instrument used for this study is the Investigating Principals Role in Teacher Effectiveness Questionnaire (IPRTEQ). The questionnaire contains 30 items, which is divided into two sections, namely, the first section is on the name of the school, while the second session gave the questions to be answered by respondents. The response format was a four likert scale requiring the respondents to answer either Strongly Agreed, Agree, Disagree and Strongly Disagreed.

3.5. Validity of the Instruments

The instrument was validated by researcher's supervisor and two experts in the Department of Educational Management, who possess relevant knowledge and expertise in the subject area under investigation after a thorough review. Their corrections were used in the final draft of the questionnaire.

3.6. Reliability of Instruments

To ensure the reliability of the instrument, the researchers plan to use the test-retest method. Questionnaires will be administered to twenty teachers outside the selected sample. After two weeks, the same instrument will be administered to the same respondents, and the data will be analyzed using Pearson's Product Moment Correlation Coefficient. This process aims to assess the consistency of responses over time and verify the reliability of the instrument.

3.7. Method of Data Collection

The questionnaire was personally administered by the researcher who explained the questionnaire to the respondents, and they were made to fill in the items, which were collected on the same day of administration

3.8. Method of Data Analysis

The data collected from the administration of the questionnaire were analyzed with the use of tables, percentages, the statistical tool of mean and standard deviation. The mean rating of 2.50 was used for decision point, such item less than 2.50 was rejected, while any item rating equal or above 2.50 was accepted. The hypothesis was tested using linear regression at 0.05 level of significance.

4. Results

This section focuses on the results and the discussion of findings.

Table 1 Principal Supervisory Role and Teachers Effectiveness

S/N	Items	SA Freq. (%)	A Freq. (%)	D Freq. (%)	SD Freq. (%)	Mean	Remark
1.	My principal evaluates teachers' instruction in the school regularly	96 (53.3%)	84 (46.7%)	-	-	3.53	Agreed
2.	My principal stimulates teachers in the school to engage in continuous professional growth	58 (32.2%)	122 (67.8%)	-	-	3.32	Agreed
3.	My principal provides leadership to teachers to developing effective teaching strategies	75 (41.7%)	105 (58.3%)	-	-	3.42	Agreed
4.	My principal improves instructional materials in the school by allocating resources seeking feedback from teachers and students	26 (14.4%)	80 (44.4%)	74 (41.1%)	-	2.73	Agreed
5.	My principal supervises the teachers very strictly during classroom observations and evaluations	64 (35.6%)	102 (56.7%)	14 (7.8%)	-	3.28	Agreed
6.	My principal allows teachers for in-service training	28 (15.6%)	24 (13.3%)	128 (71.1%)	-	2.44	Disagreed
7.	My principal provides instructional materials to teachers in the school	40 (22.2%)	114 (63.3%)	26 (14.4%)	-	3.08	Agreed
	Cluster Mean					3.16	Agreed

Source: Field Survey, 2024.

Responses from table 1 indicate that the majority of respondents agree that their principals regularly evaluate instructional practices, with 53.3% strongly agreeing and 46.7% agreeing, yielding a mean score of 3.53. This suggests a consensus on the importance of consistent instructional evaluations. Moreover, principals are perceived as promoting continuous professional growth among teachers, with 67.8% agreeing and 32.2% strongly agreeing, resulting in a mean of

3.32. Similarly, the leadership provided by principals in developing effective teaching strategies is acknowledged, with 58.3% agreeing and 41.7% strongly agreeing, leading to a mean of 3.42.

However, the data also reveal areas of concern. For instance, the provision of instructional materials and allocation of resources by principals is moderately agreed upon, with a mean score of 2.73, indicating room for improvement in resource management. Furthermore, while principals are seen as strict during classroom observations (mean of 3.28), there is a notable disagreement regarding the allowance of in-service training for teachers, where 71.1% disagree, resulting in a mean score of 2.44. The cluster mean of 3.16 indicates that while principals are generally viewed as effective in their supervisory roles, certain areas such as resource provision and support for in-service training need enhancement to further improve teacher effectiveness. Research Question 2: What is the influence of principals' effective communication role on teacher effectiveness in public senior secondary school teachers in Warri-South Local Government Area of Delta State?

Table 2 Principal Effective Communication role and Teachers Effectiveness

S/N	Items	SA Freq. (%)	A Freq. (%)	D Freq. (%)	SD Freq. (%)	Mean	Remark
8.	My principal clarifies the school's mission, goals, and expectations for teaching standards and student outcomes	34 (18.9%)	80 (44.4%)	66 (36.7%)	-	2.82	Agreed
9.	My principal provides ongoing support to teachers through regular feedback sessions, offering resources or professional development opportunities	34 (18.9%)	100 (55.6%)	46 (25.6%)	-	2.93	Agreed
10.	My principal facilitates collaborative planning sessions where teachers can discuss best practices aligning to curriculum and instructional strategies	46 (25.6%)	98 (54.4%)	36 (20.0%)	-	3.06	Agreed
11.	My principal conducts constructive feedback sessions that are focused on growth and improvement rather than just assessment	62 (34.4%)	106 (58.9%)	12 (6.7%)	-	3.28	Agreed
12.	My principal addresses conflicts or challenges within the school community promptly and constructively	94 (52.2%)	86 (47.8%)	-	-	3.52	Agreed
13.	My principal facilitates communication between teachers and parents, ensuring that there is a clear understanding of student progress, goals, and expectations	46 (25.6%)	102 (56.7%)	32 (17.8%)	-	3.08	Agreed
	Cluster Mean					3.11	Agreed

Source: Field Survey, 2024.

Responses from table 2 showed that Principals' efforts in clarifying the school's mission and teaching standards yielded a mean score of 2.82, indicating a moderate impact, with some room for improvement in communication clarity. The provision of regular feedback and resources for professional development, with a mean score of 2.93, suggests that while support is present, it may be inconsistent or insufficient. Collaboration is moderately facilitated by principals, as reflected by a mean score of 3.06, showing that while planning sessions are organized, their effectiveness could be enhanced. The highest-rated item, with a mean score of 3.52, highlights principals' effectiveness in addressing conflicts promptly and constructively, a crucial aspect of maintaining a positive school environment. The cluster mean of 3.11 reflects a general agreement among teachers that principals' communication positively influences their performance.

4.1. Test of Hypotheses

The research project utilized chi-square to assess Principals' Role in Teacher Effectiveness. The hypotheses were evaluated using a p-value in the chi-square test. Null hypotheses (H₀) are accepted when the p-values are larger than or equal to 0.05. When the p-values are below 0.05, the null hypotheses (H₀) are rejected.

Table 3 Quality of Supervisory Practices and the Effectiveness of Teachers Test Statistics

	QSP
Chi-Square	109.733 ^a
df	11
Asymp. Sig.	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.0.

4.1.1. Hypothesis One

H₀₁: There is no significant relationship between the quality of supervisory practices provided by principals and the effectiveness of teachers in southern Nigeria.

Table 3 showed that quality of supervisory practices has significant impact on teachers effectiveness ($\chi^2(11) = 109.733$, $p = .000$). This implies that there is a significant relationship between supervisory practice provided by principals and the effectiveness of teachers in southern Nigeria, thus the alternate hypotheses is accepted and the null hypotheses is rejected.

Table 4 Principal Communication Practices and Teachers Effectiveness Test Statistic

	PCP
Chi-Square	44.444 ^a
df	9
Asymp. Sig.	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.0.

4.1.2. Hypothesis Two

H₀₂: No significant relationship exists between principal communication practices implemented by principals and increased teacher effectiveness in southern Nigeria.

Table 4 showed that principal communication practices impacts teachers effectiveness ($\chi^2(9) = 44.444$, $p = .000$). This implies that there is a relationship between principal communication practices and teachers' effectiveness in Warri-South Local Government Area. Thus, the alternate hypothesis is accepted, and the null hypotheses is rejected.

5. Discussion of Findings

The findings indicate a strong perception among teachers that principals play a significant role in evaluating instructional practices and stimulating professional growth. This aligns with the work of Leithwood and Jantzi (2006), who found that effective supervisory practices significantly enhance teacher performance by providing critical feedback and promoting professional development. Similarly, Gurr and Drysdale (2010) emphasize that ongoing evaluation fosters a culture of continuous improvement, thereby improving overall teaching effectiveness.

However, the study revealed a significant gap in the provision of instructional materials. This finding is echoed in Alimi et al. (2011), who reported that inadequate resource allocation negatively impacts teacher effectiveness, indicating that principals' failure to provide necessary resources can hinder instructional quality. In contrast, Meindinyo et al. (2017) argue that the direct supervisory role of principals does not guarantee improved teacher effectiveness if resources are lacking, highlighting a potential disagreement with the view that effective supervision alone is sufficient for enhancing teaching outcomes.

The data showed that principals' efforts in communicating school goals and providing feedback yield a positive impact on teacher effectiveness. This is consistent with Ukpabio et al. (2019), who found that clear communication of expectations correlates strongly with enhanced teacher performance. Furthermore, Ukpong et al. (2018) noted that principals who engage in constructive feedback sessions promote a growth-oriented culture among teachers, supporting the findings of this study.

Conversely, Vincent et al. (2019) argued that merely communicating expectations is not enough to ensure effectiveness. Their research highlights that principals need to foster a collaborative environment where teachers feel empowered to contribute to decision-making processes. This presents a disagreement with the current study's findings, suggesting that while communication is crucial, it must be accompanied by genuine collaborative practices to fully impact teacher effectiveness. The findings indicate a strong correlation between principals' involvement of teachers in decision-making processes and teacher effectiveness. This aligns with Harris and Lambert (2003), who argue that teacher participation in decision-making leads to greater job satisfaction and commitment, ultimately improving teaching quality. Furthermore, Vincent and Owan (2019) found that schools with participative decision-making models saw marked improvements in student outcomes due to the increased investment of teachers in their roles.

However, the study also revealed that teachers feel somewhat excluded from curriculum discussions. Madukwe et al. (2019) highlight that this exclusion can lead to dissatisfaction and disengagement, potentially undermining the positive impacts identified in this research. Their findings suggest that while involvement in decision-making is beneficial, it must be comprehensive and inclusive to be truly effective, indicating a nuanced disagreement with the current study's more optimistic view on the impact of decision-making involvement.

The data indicates that teachers possess a strong understanding of subject matter and instructional techniques. This finding aligns with Victor and Owan (2019), who found that teacher efficacy is closely linked to content knowledge and pedagogical skills, significantly influencing student learning outcomes. Arop et al. (2020) further support this by showing that effective teachers who demonstrate mastery in their subjects can foster greater student engagement and performance.

In contrast, Agharuwhe and Nkechi (2009) emphasizes that without regular professional development, even the most skilled teachers may struggle to adapt to evolving educational needs. They argue that professional growth is essential for maintaining teaching effectiveness, suggesting a potential disagreement with the notion that existing competencies alone are sufficient to ensure high levels of teaching effectiveness.

6. Conclusion

This study investigated the role of principals in teacher effectiveness within public senior secondary schools in southern Nigeria. Four key areas were examined: the impact of principals' supervisory roles, the influence of their communication practices, the correlation between their involvement of teachers in decision-making, and the overall level of teaching effectiveness. The research design utilized was ex-post-facto, employing both correlational and descriptive methods to analyze data collected from 140 valid responses out of 180 distributed questionnaires.

The findings of this study underscore the critical role that principals play in enhancing teacher performance through effective supervision, communication, and collaborative decision-making. The study highlights the necessity for principals to engage in supportive leadership practices that foster an environment conducive to professional growth and instructional excellence.

Recommendations

Based on the findings, the following recommendations are made:

- Principals should continue to engage in regular and constructive evaluations of instructional practices.
- Principals should prioritize clear and consistent communication regarding school goals, expectations, and teaching standards.
- Principals should actively involve teachers in decision-making processes, particularly in areas such as curriculum development, budget allocation, and policy formulation.
- Training programs should be tailored to enhance principals' conflict resolution skills and ability to manage diverse instructional needs.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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