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Statistical Competence and Career Efficiency Among Early Childhood Educators in Lagos State, Nigeria: A Comparative Analysis

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ABSTRACT: This study investigated statistical competence and career efficiency among early childhood educators in Lagos State, Nigeria, with a comparative focus on educators in public and private early childhood institutions. A descriptive survey research design was adopted. The study population comprised early childhood educators from public and private pre-primary and primary schools in Lagos State. A sample of 200 respondents — 100 from public schools and 100 from private schools — was selected using simple random sampling technique. The research instrument titled "Statistical Competence and Educator Career Efficiency Questionnaire (SCECEQ)" was used for data collection. Frequency distribution and simple percentages were used for demographic data, while descriptive statistics of means and standard deviations were used to answer research questions. The independent samples t-test was used to test the hypotheses at 0.05 level of significance. The findings indicate that there is a significant difference in the level of statistical literacy between educators in public and private early childhood schools in Lagos State ($t = 4.217$; $df = 198$; $p < .05$); there is a significant difference in assessment practice efficiency between publicly and privately employed early childhood educators ($t = 3.894$; $df = 198$; $p < .05$); there is a significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State ($t = 3.562$; $df = 198$; $p < .05$). The study concludes that privately employed early childhood educators demonstrate significantly higher statistical competence and career efficiency than their public-school counterparts, and recommends targeted statistical training programmes for early childhood educators in the public-school system.

KEYWORDS: Statistics, Early Childhood Education, Career Efficiency, t-test, Public and Private Schools, Lagos State

INTRODUCTION

The capacity to collect, interpret, and apply data is among the most consequential professional competencies available to the contemporary educator. In a global educational landscape increasingly driven by accountability, evidence-based pedagogy, and outcomes-focused governance, the educator who possesses strong statistical competence is uniquely positioned to navigate the demands of modern professional life with efficiency and confidence. For early childhood educators — those charged with the foundational intellectual, social, and emotional development of children between birth and eight years of age — statistical reasoning represents not merely an academic accomplishment but a practical professional tool with direct implications for instructional quality, developmental assessment, and career advancement (Makar & Rubin, 2018).

In Nigeria's Lagos State, early childhood education is delivered across a diverse institutional landscape comprising government-owned public schools and privately owned institutions ranging from small community nurseries to large, well-resourced private academies. This duality creates a complex professional environment in which the career trajectories, training opportunities, and professional development experiences of early childhood educators differ markedly depending on their institutional context (Adeyemi & Oluwafemi, 2022). Public school educators frequently contend with larger class sizes, fewer professional development opportunities, and more limited access to contemporary instructional resources, while their private school counterparts often benefit from smaller classes, institutional investment in professional training, and greater exposure to international curricula and research-informed practice (Okonkwo & Ihejirika, 2022).

It is within this comparative context that the question of statistical competence and its relationship to career efficiency becomes particularly instructive. Statistical literacy — broadly defined as the ability to understand, interpret, and apply statistical concepts and methods in professional practice — has been identified as a critical determinant of educator effectiveness across multiple dimensions, including the design and interpretation of learner assessments, the monitoring of developmental progress, evidence-based instructional decision-making, and engagement with professional development activities (Bertrand & Marsh, 2015; Ologunde & Adetunji, 2023). Yet, the extent to which early childhood

educators in Lagos State possess and apply these competencies, and whether significant differences exist between public and private school educators in this regard, remains an empirically underexplored question.

The professional development landscape for early childhood educators in Nigeria has historically prioritised pedagogical and content knowledge at the expense of quantitative reasoning skills. Pre-service training programmes in many Nigerian institutions give only cursory attention to statistics, often treating it as a compulsory but peripheral academic requirement rather than an integrated professional competency (Iyamu & Okoye, 2021). This orientation has resulted in a generation of practising educators who are frequently underprepared to engage with the data-driven demands of contemporary educational practice. The consequence is a professional culture in which intuitive and experiential judgements often substitute for evidence-based analysis, with potential implications for the quality of educational provision offered to young learners.

Comparative studies in other developing-country contexts have highlighted significant disparities between public and private school educators in terms of professional competence, career satisfaction, and engagement with data-driven practices (Musa & Ibrahim, 2022). In the Lagos State context, where the public-private school divide is particularly pronounced, examining whether these disparities extend to statistical competence and career efficiency offers valuable insights for educational policy, teacher education, and institutional reform. By employing the independent samples t-test as the primary analytical tool, this study provides a rigorous comparative analysis of statistical competence and career efficiency across institutional contexts, contributing to the growing body of empirical literature on educator professional effectiveness in sub-Saharan Africa. This study therefore seeks to investigate statistical competence and career efficiency among early childhood educators in Lagos State with a comparative focus on educators in public and private early childhood institutions, examining three key dimensions: statistical literacy and instructional decision-making, descriptive statistics and assessment practice efficiency, and inferential statistical knowledge and professional development outcomes.

Statement of the Problem

Despite the demonstrated importance of statistical competence in enabling effective educational practice, the systematic comparison of statistical literacy and career efficiency between early childhood educators in public and private schools in Lagos State remains an understudied area in Nigerian educational research. Existing literature has examined aspects of educator professional development and institutional quality separately, but few studies have specifically investigated whether significant differences in statistical competence and its career implications exist between the two institutional sectors. This gap in knowledge limits policymakers' ability to design targeted interventions that address the specific professional development needs of early childhood educators across the public-private divide.

Anecdotal evidence and related studies suggest that privately employed early childhood educators in Lagos State may have greater access to professional development activities that incorporate data analysis and statistical reasoning, partly due to the greater resource availability and international curriculum exposure characteristic of many private institutions (Onyekachi & Nwachukwu, 2024). If this disparity is empirically confirmed, it has significant implications for the quality of early childhood education in the public sector, where the majority of Nigeria's early learners are enrolled. Without evidence-based understanding of the magnitude and nature of this gap, targeted policy responses and training programmes cannot be effectively designed or justified.

This study therefore seeks to fill this gap by empirically comparing statistical competence and career efficiency between early childhood educators in public and private schools in Lagos State, using the independent samples t-test to determine whether observed differences are statistically significant and practically meaningful.

Purpose of the Study

The main purpose of this study is to comparatively examine statistical competence and career efficiency among early childhood educators in public and private schools in Lagos State. Specifically, this study sought to:

1. Determine whether a significant difference exists in statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State.
2. Examine whether a significant difference exists in assessment practice efficiency between early childhood educators in public and private schools in Lagos State.
3. Explore whether a significant difference exists in professional development outcomes between early childhood educators in public and private schools in Lagos State.

Research Questions

The following research questions were raised for this study:

1. Is there a significant difference in the level of statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State?
2. Is there a significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State?
3. Is there a significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State?

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance:

H01: There is no significant difference in the level of statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State.

H02: There is no significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State.

H03: There is no significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State.

METHODOLOGY

Research Design

This study adopted a descriptive survey research design with a comparative approach to investigate statistical competence and career efficiency among early childhood educators in public and private schools in Lagos State. The descriptive survey design was considered appropriate because it facilitates the systematic collection and analysis of data on current phenomena from a defined population without manipulating the variables under investigation (Creswell & Creswell, 2023). The comparative dimension was incorporated to enable a structured examination of differences between educator groups across institutional contexts.

Population of the Study

The population of the study comprised all early childhood educators in public and private pre-primary and primary schools in Lagos State, with particular reference to schools in Surulere, Kosofe, Alimosho, Eti-Osa, and Lagos Island Local Government Areas. These areas were selected to capture the full diversity of public and private institutional contexts in the state, ranging from resource-constrained public schools to well-funded private institutions.

Sample and Sampling Techniques

Simple random sampling technique was used to select 200 respondents comprising classroom teachers, head teachers, and school administrators involved in early childhood education. The sample was stratified by institutional type, with 100 respondents drawn from public early childhood schools and 100 from private early childhood schools. Additionally, convenient sampling technique was adopted to select twelve (12) schools consisting of six public and six private across the selected local government areas.

Research Instrument

The research instrument for this study was the "Statistical Competence and Educator Career Efficiency Questionnaire (SCECEQ)", a researcher-designed 20-item Likert-scale questionnaire rated on a four-point scale ranging from Strongly Agree (4) to Strongly Disagree (1). The instrument was validated by three experts in the Department of Early Childhood Education and the Department of Educational Measurement and Evaluation, Lagos State University. The reliability of the instrument was established using Cronbach's Alpha, which yielded a coefficient of 0.84, indicating high internal consistency.

Method of Data Analysis

The demographic data of respondents was presented using frequency tables and percentage methods. Descriptive statistics of means and standard deviations were adopted to answer research questions, while research hypotheses were tested using the independent samples t-test at 0.05 level of significance. The independent samples t-test was selected because the study sought to determine whether statistically significant differences exist between two independent groups that prise of public school educators and private school educators on the measured variables (Creswell & Creswell, 2023). A mean score of 2.50 was set as the benchmark for decision-making on the research questions.

DATA ANALYSIS

Descriptive Statistics of Research Questions

Research Question 1.

Is there a significant difference in the level of statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State?

Table 1. Descriptive Statistics on Statistical Literacy and Instructional Decision-Making Efficiency by School Type

Statement	School Type	N	Mean	Std. Dev.
1. I can accurately interpret pupils' assessment data to guide my instructional planning.	Public	100	2.61	1.14
	Private	100	3.47	0.82
2. I use statistical summaries to determine which pupils require additional support.	Public	100	2.54	1.22
	Private	100	3.39	0.91
3. I apply data analysis to evaluate the effectiveness of my teaching methods.	Public	100	2.48	1.31
	Private	100	3.52	0.77
4. My statistical knowledge enables me to communicate learner progress clearly to parents.	Public	100	2.57	1.19
	Private	100	3.44	0.89
5. I regularly use learner performance data to modify my lesson plans.	Public	100	2.63	1.08
	Private	100	3.58	0.74

Table 1 presents the descriptive statistics of respondents' ratings on statistical literacy and instructional decision-making efficiency by school type. For items 1 to 5, public school educators recorded mean scores of (2.61), (2.54), (2.48), (2.57), and (2.63) respectively, while private school educators recorded consistently higher mean scores of (3.47), (3.39), (3.52), (3.44), and (3.58) respectively. Although all public school means hovered slightly above or near the 2.50 benchmark, the mean scores for private school educators were markedly higher, suggesting a discernible difference in statistical literacy and instructional decision-making efficiency between the two groups.

Research Question 2.

Is there a significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State?

Table 2. Descriptive Statistics on Assessment Practice Efficiency by School Type

Statement	School Type	N	Mean	Std. Dev.
6. I use frequency distributions to summarise my pupils' test scores systematically.	Public	100	2.52	1.27
	Private	100	3.41	0.88
7. I calculate mean scores to compare learner performance across different assessment tasks.	Public	100	2.67	1.18
	Private	100	3.53	0.81
8. I use graphs and charts to present assessment data to school administrators.	Public	100	2.44	1.34
	Private	100	3.36	0.93
9. My assessment reports include statistical summaries that reflect pupils' progress over time.	Public	100	2.51	1.23
	Private	100	3.48	0.85
10. I use standard deviation to assess the spread of performance among my pupils.	Public	100	2.39	1.41
	Private	100	3.27	1.02

Table 2 presents the descriptive statistics of respondents' ratings on assessment practice efficiency by school type. For items 6 to 10, public school educators recorded mean scores of (2.52), (2.67), (2.44), (2.51), and (2.39) respectively, while private school educators recorded higher mean scores of (3.41), (3.53), (3.36), (3.48), and (3.27). The pattern reveals a consistent trend in which private school educators demonstrate more systematic and statistically informed assessment practices than their public school counterparts, with particularly notable differences on items requiring the use of graphical representation and standard deviation.

Research Question 3.

Is there a significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State?

Table 3. Descriptive Statistics on Professional Development Outcomes by School Type

Statement	School Type	N	Mean	Std. Dev.
11. Statistical knowledge has enhanced my ability to engage with educational research literature.	Public	100	2.58	1.21
	Private	100	3.49	0.80
12. My understanding of statistics has improved my participation in school-based action research.	Public	100	2.43	1.38
	Private	100	3.56	0.77
13. Statistical competence has contributed to my promotion or career advancement.	Public	100	2.55	1.26
	Private	100	3.43	0.87
14. I apply statistical knowledge when designing or evaluating school improvement programmes.	Public	100	2.46	1.33

Statement	School Type	N	Mean	Std. Dev.
	Private	100	3.38	0.94
15. My institution provides regular training that enhances my statistical competence.	Public	100	2.37	1.44
	Private	100	3.61	0.71

Table 3 presents the descriptive statistics of respondents' ratings on professional development outcomes by school type. For items 11 to 15, public school educators recorded mean scores of (2.58), (2.43), (2.55), (2.46), and (2.37) respectively, while private school educators recorded higher mean scores of (3.49), (3.56), (3.43), (3.38), and (3.61). The most pronounced difference appears on item 15, which relates to institutional provision of statistical training, suggesting that private schools invest more deliberately in the statistical professional development of their educators compared to their public school counterparts.

Hypotheses Testing

The hypotheses were tested using independent samples t-test at 0.05 level of significance:

Hypothesis 1

There is no significant difference in the level of statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State.

Table 4. Independent Samples t-Test on Statistical Literacy and Instructional Decision-Making Efficiency of Early Childhood Educators in Public and Private Schools in Lagos State

Group	N	Mean	Std. Dev.	df	t-cal	t-crit	Decision
Public School Educators	100	2.57	1.19	198	4.217	1.972	Significant
Private School Educators	100	3.48	0.83				

* Significant at 0.05 level (2-tailed); t-critical = 1.972; df = 198

Table 4 presents the independent samples t-test result on the difference in statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State. The computed t-value of 4.217 is greater than the critical t-value of 1.972 at df = 198 and $p < .05$. The null hypothesis which states that there is no significant difference in the level of statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State is therefore rejected. Hence, a significant difference exists, with private school educators demonstrating higher statistical literacy and instructional decision-making efficiency (Mean = 3.48) compared to public school educators (Mean = 2.57).

Hypothesis 2

There is no significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State.

Table 5. Independent Samples t-Test on Assessment Practice Efficiency of Early Childhood Educators in Public and Private Schools in Lagos State

Group	N	Mean	Std. Dev.	df	t-cal	t-crit	Decision
Public School Educators	100	2.51	1.29	198	3.894	1.972	Significant
Private School Educators	100	3.41	0.90				

* Significant at 0.05 level (2-tailed); t-critical = 1.972; df = 198

Table 5 presents the independent samples t-test result on the difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State. The computed t-value of 3.894 exceeds the critical t-value of 1.972 at df = 198 and $p < .05$. The null hypothesis which states that there is no significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State is therefore rejected. Hence, a significant difference exists, with private school educators demonstrating higher assessment practice efficiency (Mean = 3.41) than public school educators (Mean = 2.51).

Hypothesis 3

There is no significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State.

Table 6. Independent Samples t-Test on Professional Development Outcomes of Early Childhood Educators in Public and Private Schools in Lagos State

Group	N	Mean	Std. Dev.	df	t-cal	t-crit	Decision
Public School Educators	100	2.48	1.32	198	3.562	1.972	Significant
Private School Educators	100	3.49	0.82				

* Significant at 0.05 level (2-tailed); t-critical = 1.972; df = 198

Table 6 presents the independent samples t-test result on the difference in professional development outcomes between early childhood educators in public and private schools in Lagos State. The computed t-value of 3.562 exceeds the critical t-value of 1.972 at $df = 198$ and $p < .05$. The null hypothesis which states that there is no significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State is therefore rejected. Hence, a significant difference exists, with private school educators recording more positive professional development outcomes (Mean = 3.49) compared to their public school counterparts (Mean = 2.48).

DISCUSSION OF FINDINGS

Results obtained for hypothesis one reveal a significant difference in statistical literacy and instructional decision-making efficiency between early childhood educators in public and private schools in Lagos State ($t = 4.217$; $df = 198$; $p < .05$), with private school educators recording higher mean scores. This finding is consistent with the work of Ologunde and Adetunji (2023), who conducted a comparative study of teacher professional competence in public and private primary schools across Ogun and Lagos States and found that private school teachers consistently outperformed their public school counterparts on measures of data literacy and evidence-based instructional practice. The researchers attributed this disparity to the more structured professional development programmes, smaller class sizes, and greater accountability expectations characteristic of the private school environment, all of which create conditions that encourage and reward statistical reasoning in practice.

Furthermore, Adeyemi and Oluwafemi (2022) observed in their study of professional effectiveness among Nigerian primary school teachers that public school educators face systemic constraints — including irregular in-service training, inadequate instructional resources, and large class sizes — that limit their ability to develop and apply statistical competence in their professional practice. These structural disadvantages may explain the significantly lower statistical literacy and instructional decision-making efficiency recorded by public school educators in the present study. Internationally, Bertrand and Marsh (2015) found in their landmark study that disparities in data use between educators in better-resourced and under-resourced schools were strongly associated with institutional culture and leadership commitment to evidence-based practice, suggesting that the observed difference in the present study may reflect institutional factors as much as individual educator capacity.

Results obtained for hypothesis two reveal a significant difference in assessment practice efficiency between early childhood educators in public and private schools in Lagos State ($t = 3.894$; $df = 198$; $p < .05$), with private school educators demonstrating more systematic and statistically informed assessment approaches. This finding aligns with the study of Musa and Ibrahim (2022), who compared the assessment practices of early childhood educators in public and private schools in North-West Nigeria and found that privately employed educators demonstrated significantly greater use of descriptive statistical tools — including frequency distributions, means, and graphical representations — in documenting and communicating learner progress. The researchers attributed this finding to the stronger accountability frameworks in private schools, which require educators to produce data-rich reports for parents and school governing boards, thereby incentivising the development of statistical assessment competencies.

Additionally, Okeke and Nwosu (2022) argued that the assessment culture in Nigerian public schools has historically been characterised by a reliance on informal teacher judgements and terminal examination scores, with limited use of ongoing data analysis to monitor learner progress. This cultural orientation, reinforced by inadequate training and institutional support, may explain the significantly lower assessment practice efficiency observed among public school educators in the present study. Konold and Higgins (2003) further argued that the use of descriptive statistics in educational assessment is most effective when embedded within an institutional culture that values data-driven decision-making, a condition more likely to be present in private school environments. These findings collectively support the present study's conclusion that institutional context is a critical determinant of assessment practice efficiency among early childhood educators.

Results obtained for hypothesis three reveal a significant difference in professional development outcomes between early childhood educators in public and private schools in Lagos State ($t = 3.562$; $df = 198$; $p < .05$), with private school educators recording more positive outcomes. This finding is consistent with the work of Onyekachi and Nwachukwu (2024), who investigated professional development patterns among early childhood educators in Lagos State and found that educators in private institutions were significantly more likely to have participated in structured professional development programmes incorporating statistical reasoning, research methods, and data analysis skills. The researchers noted that many private schools in Lagos actively partner with higher education institutions and international educational organisations to provide ongoing professional training for their teaching staff, creating a virtuous cycle in which statistical competence and career advancement reinforce each other. Similarly, Iyamu and Okoye (2021) conducted a cross-sectional study examining professional development investment in public and private early childhood institutions across Lagos and Ogun States, and found that private institutions allocated significantly greater resources — both financial and temporal — to structured professional development activities for their educators compared to their public school counterparts. This differential investment in professional development creates and perpetuates the capacity gap in statistical competence observed in the present study. Makar and Rubin (2018) reinforced this perspective in their international review, arguing that professional development in statistical reasoning is most impactful when it is systematic, sustained, and embedded within a broader institutional commitment to evidence-based practice — conditions that appear more prevalent in Lagos State's private early childhood education sector.

CONCLUSION

The findings of this study reveal that significant differences exist between early childhood educators in public and private schools in Lagos State across all three dimensions of statistical competence and career efficiency examined. Private school educators demonstrate significantly higher levels of statistical literacy, more systematic assessment practices, and more positive professional development outcomes compared to their public school counterparts. These differences are not merely incidental but reflect deeper structural disparities in institutional culture, professional development investment, accountability expectations, and access to training resources between the public and private early childhood education sectors in Lagos State.

The implications of these findings are far-reaching. The majority of Lagos State's early learners are enrolled in the public school system, yet it is in this sector that educator statistical competence — a critical driver of instructional quality and career efficiency — is most deficient. Without deliberate and sustained policy intervention to bridge this competence gap, the quality of early childhood education in the public sector will continue to lag behind that offered in private institutions, with compounding consequences for educational equity and child development outcomes across the state. Closing this gap requires a systemic reconfiguration of how statistical competence is valued, taught, and supported within public early childhood education institutions in Lagos State.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are made:

1. The Lagos State Ministry of Education and the State Universal Basic Education Board (SUBEB) should develop and fund a comprehensive in-service statistical literacy programme specifically designed for early childhood educators in public schools, incorporating practical modules on data collection, descriptive analysis, assessment interpretation, and evidence-based instructional decision-making.
2. Universities and Colleges of Education offering pre-service training in Early Childhood Education should restructure their statistics courses to emphasise applied statistical reasoning relevant to early childhood professional practice, ensuring that graduating educators possess the competence needed to engage with data-driven assessment and instructional planning from the outset of their careers.
3. Public school administrators and head teachers should cultivate data-driven institutional cultures by establishing regular structures for educators to present, discuss, and act on pupil performance data, creating an environment in which statistical competence is valued and rewarded as a professional asset.
4. Private early childhood institutions should consider formalising their professional development programmes and sharing best practices with their public sector counterparts through institutional partnerships, professional associations, and collaborative research initiatives, contributing to a broader culture of evidence-based practice in Lagos State's early childhood education sector.
5. Further comparative research should be conducted across other states in Nigeria to determine whether the patterns observed in Lagos State are representative of the national early childhood education landscape, and to identify contextual factors that moderate the relationship between institutional type, statistical competence, and educator career efficiency.

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