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The Role Of Statistics On Staff Development And Training In Federal Polytechnic, Ugep, Cross River State

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ABSTRACT
This study examined the role of statistics in staff development and training at Federal Polytechnic, Ugep, Cross River State. The research adopted a descriptive survey design with a population of 285 academic and non-academic staff, from which a sample of 165 respondents was selected using Taro Yamane's formula. A structured questionnaire with a reliability coefficient of 0.84 was employed for data collection. Data were analyzed using mean scores, standard deviation, and chi-square statistics. The findings revealed that statistical analysis significantly influences needs assessment for training programs (mean = 3.68), effectiveness evaluation of training interventions (mean = 3.72), and decision-making processes in staff development initiatives (mean = 3.65). The chi-square results showed significant relationships between statistical application and training outcomes at $p < 0.05$ level of significance. The study concluded that statistics plays a crucial role in identifying training needs, evaluating program effectiveness, and informing policy decisions regarding staff development. It was recommended that the institution should establish a dedicated statistical unit for human resource development, invest in statistical software and training for HR personnel, and adopt data-driven approaches in designing and implementing staff development programs.
Keywords: Statistics, staff development, training evaluation, needs assessment, decision-making, Federal Polytechnic Ugep

INTRODUCTION

Staff development and training constitute fundamental pillars for organizational growth and sustainability in tertiary institutions. The dynamic nature of educational environments demands continuous improvement of staff competencies to meet evolving academic and administrative challenges (Owan et al., 2023). In Nigeria's polytechnic education system, staff development initiatives are designed to enhance teaching quality, research productivity, and administrative efficiency. However, the success of these programs largely depends on systematic planning, implementation, and evaluation processes that rely heavily on statistical tools and techniques (Akpan & Ering, 2020).

Statistics serves as an indispensable tool in modern human resource management, providing empirical foundations for identifying training needs, allocating resources, and measuring program outcomes (Nwanekpe et al., 2022). In the context of Federal Polytechnic, Ugep, Cross River State, the application of statistical methods in staff development can transform intuition-based decisions into evidence-driven strategies. Statistical techniques enable institutions to analyze performance gaps, predict future training requirements, and evaluate the return on investment in staff development programs (Agba et al., 2021).

Despite the recognized importance of statistics in human resource development, many tertiary institutions in Nigeria, including polytechnics, have not fully integrated statistical approaches into their staff training frameworks (Bassey et al., 2020).

The Federal Polytechnic, Ugep, established to provide technical and vocational education, faces numerous challenges in optimizing its human capital development initiatives. These challenges include limited resources, diverse training needs across departments, and difficulties in measuring training effectiveness (Edet & Ekpenyong, 2019). Without robust statistical systems for needs assessment and program evaluation, the institution risks implementing training programs that may not address actual competency gaps or yield measurable improvements in staff performance. Research has shown that organizations that employ statistical methods in training management achieve higher success rates in employee development compared to those relying on subjective assessments (Eze et al., 2021).

Previous studies have explored various aspects of staff development in Nigerian tertiary institutions. Olofu and Akpochafo (2021) investigated training needs assessment in universities and found that data-driven approaches improved training program relevance by 64%. Similarly, Udida et al. (2020) examined evaluation methods in polytechnic education and emphasized the importance of quantitative measures in determining program impact. However, there remains a gap in understanding the specific role of statistics in the entire spectrum of staff development activities, particularly in polytechnic settings. Most existing research focuses on general training practices without adequately addressing how statistical tools can be leveraged to enhance each phase of the staff development cycle (Archibong & Nja, 2011).

Furthermore, the integration of statistical literacy among human resource managers in polytechnics remains inadequate. Many HR practitioners lack the necessary skills to collect, analyze, and interpret data for informed decision-making in staff development matters (Ntukidem et al., 2022). This limitation undermines the effectiveness of training programs and perpetuates a cycle of resource wastage and suboptimal outcomes. The situation is particularly concerning in institutions like Federal Polytechnic, Ugep, where resource constraints necessitate maximum efficiency in all development initiatives.

Statement of the Problem

Federal Polytechnic, Ugep, like many tertiary institutions in Nigeria, invests substantial financial and human resources in staff development and training programs annually. However, there is limited empirical evidence demonstrating how statistical methods are utilized to optimize these investments. The institution faces challenges in accurately identifying training needs across diverse staff categories, measuring the effectiveness of implemented training programs, and making data-informed decisions regarding future development initiatives. Preliminary observations suggest that training programs are often designed based on administrative discretion rather than systematic statistical analysis of performance data, employee competency assessments, or organizational needs. This approach may result in misalignment between training interventions and actual staff development requirements, leading to inefficient resource utilization and suboptimal improvement in staff performance. According to Chiekezie et al. (2017), less than a quarter of Nigerian tertiary institutions employ systematic quantitative methods to evaluate training return on investment, resulting in continued skepticism about the value of staff development programs among stakeholders. Similarly, Okwudishu (2015) observed that inadequate human resource information systems in most polytechnics constrain their ability to collect and analyze training-related data effectively, perpetuating reliance on subjective and potentially biased decision-making processes. Furthermore, the absence of rigorous statistical evaluation frameworks makes it difficult to determine whether training programs achieve their intended objectives or provide value for money. The problem is compounded by insufficient statistical capacity within the institution's human resource department, limited integration of data management systems, and inadequate feedback mechanisms for continuous improvement of training programs. Without addressing these statistical deficiencies, the institution risks perpetuating ineffective training practices, failing to demonstrate accountability in staff development expenditures, and missing opportunities to enhance organizational performance through targeted human capital development. This study therefore seeks to investigate the role of statistics in staff development and training at Federal Polytechnic, Ugep, with a view to providing empirical insights that can inform policy and practice.

Aim and Objectives of the Study

The aim of this study is to examine the role of statistics on staff development and training in Federal Polytechnic, Ugep, Cross River State. Specifically, the study sought to:

1. Determine the extent to which statistical analysis influences needs assessment for staff training programs in Federal Polytechnic, Ugep.
2. Assess the role of statistics in evaluating the effectiveness of staff development programs in Federal Polytechnic, Ugep.
3. Examine the influence of statistical data on decision-making processes regarding staff development and training in Federal Polytechnic, Ugep.

Research Questions

The following research questions guided the study:

1. To what extent does statistical analysis influence needs assessment for staff training programs in Federal Polytechnic, Ugep?
2. What is the role of statistics in evaluating the effectiveness of staff development programs in Federal Polytechnic, Ugep?
3. How does statistical data influence decision-making processes regarding staff development and training in Federal Polytechnic, Ugep?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between statistical analysis and needs assessment for staff training programs in Federal Polytechnic, Ugep.
2. There is no significant relationship between the use of statistics and the evaluation of staff development program effectiveness in Federal Polytechnic, Ugep.
3. Statistical data does not significantly influence decision-making processes regarding staff development and training in Federal Polytechnic, Ugep.

LITERATURE REVIEW

Theoretical Review

This study is anchored on three complementary theories: Human Capital Theory, Evidence-Based Management Theory, and Systems Theory.

Human Capital Theory

This theory was developed by Gary Becker (1964). It posits that investments in employee education, training, and development yield returns through enhanced productivity, innovation, and organizational performance. The theory suggests that employees are valuable assets whose worth can be increased through systematic development interventions. In the context of this study, Human Capital Theory provides the foundational justification for staff development programs, asserting that organizations that invest strategically in employee competencies gain competitive advantages. The theory emphasizes the importance of measuring returns on training investments, which directly relates to the role of statistics in quantifying costs, benefits, and productivity improvements associated with staff development initiatives. Statistical analysis enables institutions to validate the theory's predictions by demonstrating empirical relationships between training inputs and performance outputs, thereby justifying continued investment in human capital development (Sweetland, 1996).

Evidence-Based Management Theory

The theory articulated by Pfeffer and Sutton (2006), advocates for organizational decision-making grounded in the best available scientific evidence rather than intuition, anecdote, or ideology. This theory challenges managers to adopt a more rigorous, data-driven approach to solving organizational problems and making strategic choices. Evidence-based management emphasizes six sources of evidence including scientific research, organizational data, professional expertise, stakeholder values, and contextual factors. In staff development, this theory supports the systematic collection and statistical analysis of data to inform decisions about training needs, program design, implementation strategies, and evaluation methods. The theory directly connects to this study's focus on how statistical data influences decision-

making processes regarding staff development. By embracing evidence-based principles, institutions can move beyond subjective assessments to make informed choices that are more likely to produce desired outcomes (Rousseau, 2006).

Systems Theory

This theory which was pioneered by Ludwig von Bertalanffy and applied to organizations by Peter Senge (2006), views organizations as complex, interconnected systems where changes in one component affect other parts. The theory emphasizes holistic understanding of organizational functioning, feedback loops, and dynamic interactions among subsystems. In the context of staff development, Systems Theory suggests that training interventions create ripple effects throughout the institution, influencing teaching quality, student outcomes, administrative efficiency, and institutional reputation. Statistical methods such as structural equation modeling and path analysis enable researchers to map these complex relationships and understand how training investments propagate through organizational systems. This theoretical perspective supports the comprehensive approach taken in this study, which examines statistics' role across multiple dimensions of staff development including needs assessment, evaluation, and decision-making, recognizing that these elements form an integrated system rather than isolated activities (Mele et al., 2010).

Empirical Review

Several empirical studies have investigated various aspects of statistics in staff development and training. Olofu and Akpochafo (2021) conducted a study on training needs assessment and academic staff development in Nigerian universities. Using a survey design with 450 academic staff across three federal universities in southern Nigeria, the researchers found that institutions employing statistical needs assessment methods achieved 64% higher alignment between training programs and actual staff development needs compared to those using informal assessment approaches. The study revealed that gap analysis, competency mapping, and performance data correlation were the most effective statistical techniques for identifying priority training areas. The researchers recommended systematic adoption of quantitative needs assessment protocols across all Nigerian universities.

In a related study, Tahir et al. (2021) examined academic staff training and professional development practices in selected Asian countries including Malaysia, Indonesia, and Thailand. The comparative study involving 1,200 academic staff revealed that institutions with robust data management systems for tracking training participation, costs, and outcomes demonstrated 47% higher staff satisfaction with development programs and 35% better performance improvements post-training. Statistical process control techniques were found to be particularly effective in monitoring training program consistency and quality. The study concluded that technology-enabled statistical tracking systems represented best practice in staff development management.

Chiekezie et al. (2017) investigated training evaluation practices in Nigerian tertiary institutions with specific focus on return on investment calculations. The study surveyed 89 universities and polytechnics and found that only 23% systematically calculated training ROI using statistical methods. Institutions that did employ ROI analysis reported greater stakeholder confidence in training programs and more consistent budget allocations for staff development. The researchers identified lack of statistical expertise among HR personnel and absence of integrated data systems as primary barriers to effective training evaluation. The study recommended capacity building for HR staff in financial and statistical analysis techniques.

Brown and Sitzmann (2011) conducted a meta-analysis of 256 training effectiveness studies published between 1985 and 2010, examining the role of needs assessment in training outcomes. Their analysis revealed that training programs preceded by rigorous statistical needs assessment demonstrated effect sizes 0.42 standard deviations higher than programs without formal needs assessment. The researchers found that surveys with statistical analysis, performance data mining, and competency gap analysis were strongest predictors of training success. The meta-analysis provided compelling evidence for the value of data-driven needs identification in optimizing training effectiveness.

Salas et al. (2012) reviewed the science of training and development in organizations, synthesizing over 500 empirical studies. Their comprehensive analysis identified statistical evaluation as one of seven

critical success factors for effective training programs. Organizations that employed experimental and quasi-experimental designs with statistical controls demonstrated higher ability to attribute performance improvements to training interventions rather than confounding factors. The review highlighted pre-test/post-test comparisons, control group designs, and longitudinal statistical tracking as gold-standard evaluation methods. The researchers emphasized that advancing training science required greater methodological rigor and statistical sophistication in evaluation research.

Akpan (2014) examined data-driven decision making in polytechnic education management across six federal polytechnics in Nigeria. Using a mixed-methods approach with 324 administrators and managers, the study found that polytechnics with established management information systems and analytical capabilities achieved 52% better strategic goal attainment compared to institutions relying primarily on experience-based decisions. Statistical forecasting, trend analysis, and predictive modeling were identified as particularly valuable for workforce planning and staff development strategy formulation. The study revealed that investment in statistical infrastructure and personnel training yielded substantial returns through improved decision quality.

Etor et al. (2013) investigated the relationship between training participation and academic performance in Nigerian universities. The correlational study involving 280 lecturers found significant positive relationships between structured professional development participation and multiple performance indicators including student evaluation scores ($r = 0.68$, $p < 0.01$), research output ($r = 0.54$, $p < 0.01$), and promotion progression ($r = 0.61$, $p < 0.01$). Multiple regression analysis revealed that training frequency and quality jointly predicted 47% of variance in overall academic performance. The statistical evidence provided strong justification for continued investment in faculty development programs.

Udida et al. (2020) studied evaluation methods in technical and vocational education with focus on polytechnics in Akwa Ibom State, Nigeria. The descriptive survey involving 156 administrators and instructors revealed that 78% of respondents agreed that quantitative evaluation methods provided more reliable evidence of training effectiveness than qualitative approaches alone. However, only 34% of polytechnics had capacity to implement sophisticated statistical evaluations due to limited expertise and technology. The study recommended blended evaluation approaches combining statistical rigor with contextual understanding, supported by systematic capacity development for evaluation personnel.

Bassey et al. (2020) investigated statistics anxiety among polytechnic students in Cross River State, examining how instructional strategies influenced learning outcomes. The study involving 400 students found that practical, application-oriented statistics teaching reduced anxiety and improved competence. While focused on student learning, the findings have implications for staff development, suggesting that HR personnel training in statistics should emphasize practical application to real organizational problems rather than abstract theory. The researchers recommended experiential learning approaches for building statistical capacity among non-specialists.

Ntukidem et al. (2022) examined human resource managers' statistical literacy and training effectiveness in Nigerian polytechnics. The study involving 95 HR managers across 15 polytechnics found significant positive correlation ($r = 0.71$, $p < 0.01$) between managers' statistical competence and perceived effectiveness of training programs under their supervision. Regression analysis indicated that statistical literacy predicted 50% of variance in training program success. The study identified critical statistical competencies for HR managers including descriptive statistics, correlation analysis, survey design, and data visualization. Recommendations included integration of statistics modules in HR professional development programs.

Conceptual Review

Staff development and training have become critical components of organizational success in the contemporary educational landscape. According to Armstrong and Taylor (2020), staff development encompasses all learning experiences designed to improve employee performance, enhance career progression, and align individual competencies with organizational objectives. In tertiary institutions, effective staff development programs contribute to improved teaching quality, research output, and institutional competitiveness (Tahir et al., 2021). The systematic application of statistical methods in

managing these programs has emerged as a best practice in human resource management, enabling institutions to maximize returns on their training investments.

The concept of needs assessment represents the foundational stage in staff development planning. Needs assessment involves systematic collection and analysis of data to identify gaps between current and desired performance levels (Gupta et al., 2007). Statistical techniques such as gap analysis, correlation studies, and multivariate analysis enable organizations to prioritize training needs based on empirical evidence rather than assumptions (Brown & Sitzmann, 2011). Research by Owan (2019) in Cross River State educational institutions revealed that statistical needs assessment improved training program relevance by identifying specific competency deficits that required intervention. Similarly, descriptive statistics including means, frequencies, and percentages provide quantifiable insights into the magnitude and distribution of training needs across different staff categories and departments.

Performance data analysis constitutes another critical application of statistics in needs assessment. By analyzing performance appraisal records, student evaluation scores, and productivity metrics using statistical software, institutions can identify patterns and trends that signal training requirements (Cascio & Aguinis, 2019). Etor et al. (2013) demonstrated that correlation analysis between training participation and performance indicators helped Nigerian universities identify high-impact training areas. Furthermore, inferential statistics enable HR managers to determine whether observed performance gaps are statistically significant or attributable to random variation, thereby ensuring that resources are allocated to address genuine development needs.

The evaluation of training effectiveness represents a domain where statistics plays an indispensable role. Kirkpatrick and Kirkpatrick (2016) proposed a four-level evaluation model encompassing reaction, learning, behavior, and results, each requiring different statistical approaches for measurement. Descriptive statistics summarize participants' reactions to training programs, while pre-test and post-test comparisons using paired t-tests or analysis of variance reveal the extent of learning achieved (Phillips & Phillips, 2016). Longitudinal studies employing regression analysis can assess whether behavioral changes observed after training persist over time and contribute to organizational outcomes.

Return on investment analysis, a sophisticated statistical approach, quantifies the financial benefits of training relative to costs incurred. Becker et al. (2009) argued that ROI calculations provide compelling evidence for continued investment in staff development by demonstrating tangible value creation. In the Nigerian context, research by Chiekezie et al. (2017) found that only 23% of tertiary institutions systematically calculated training ROI, resulting in continued skepticism about training value among stakeholders. Statistical process control techniques, borrowed from quality management, can also monitor training program consistency and identify variations requiring corrective action (Oakland, 2014).

Decision-making in staff development encompasses strategic choices about program design, resource allocation, timing, and target populations. Evidence-based decision-making, grounded in statistical analysis, has replaced intuitive approaches in progressive organizations (Davenport & Harris, 2017). Predictive analytics, utilizing regression models and machine learning algorithms, enable institutions to forecast future training needs based on enrollment trends, curriculum changes, and technological developments (Bersin, 2013). Akpan (2014) noted that Nigerian polytechnics adopting data-driven decision-making achieved better alignment between training programs and institutional strategic objectives.

Budget allocation decisions benefit significantly from statistical analysis of cost-effectiveness across different training modalities. Analysis of variance can compare the effectiveness of in-house training, external workshops, and online programs, guiding resource allocation decisions (Noe, 2020). Time series analysis helps identify optimal scheduling for training programs by examining seasonal variations in staff availability and institutional workload patterns. Furthermore, cluster analysis can segment staff into groups with similar development needs, enabling customized training approaches that improve efficiency and outcomes (Hair et al., 2019).

The integration of management information systems and statistical software has revolutionized staff development management. Contemporary HR systems automatically capture, store, and analyze training-related data, generating real-time dashboards and reports that inform decision-making (Kavanagh &

Johnson, 2017). However, technological adoption in Nigerian polytechnics remains limited. A study by Okwudishu (2015) revealed that less than 40% of polytechnics had functional HR information systems, constraining their ability to leverage statistics for staff development. The digital divide and inadequate technical capacity among HR personnel perpetuate reliance on manual, inefficient processes.

Statistical literacy among HR professionals determines the extent to which statistical tools are effectively utilized. According to Carlson and Thorne (2003), statistical competence encompasses understanding of basic concepts, ability to select appropriate analytical techniques, proficiency in using statistical software, and skill in interpreting and communicating results. Professional development for HR staff in statistical methods has been identified as a critical success factor for data-driven staff development (Lawler et al., 2004). Unfortunately, curricula in many Nigerian HR training programs inadequately address statistical skills, producing practitioners ill-equipped for evidence-based practice (Adewale & Bakare, 2014).

Quality assurance in tertiary education increasingly demands statistical evidence of staff competence and continuous development. Accreditation bodies require institutions to demonstrate systematic approaches to staff development supported by data on participation rates, competency improvements, and impact on educational quality (National Board for Technical Education, 2020). Statistical reports on training activities, outcomes, and trends have become essential components of institutional self-assessment documents. Institutions that maintain comprehensive statistical records of staff development activities are better positioned to meet regulatory requirements and demonstrate accountability to stakeholders.

Cross-cultural perspectives on statistical application in staff development reveal varying practices globally. In developed countries, sophisticated statistical techniques including structural equation modeling and multilevel analysis are routinely employed to understand complex relationships between training, performance, and organizational outcomes (Salas et al., 2012). Developing countries, including Nigeria, face capacity constraints but are gradually recognizing the value of statistical approaches. Comparative studies suggest that contextual adaptation of statistical methods, rather than wholesale adoption of Western practices, yields better results in African educational institutions (Teferra & Altbach, 2004).

Challenges in applying statistics to staff development include data quality issues, resistance to change, resource constraints, and technical complexity. Missing data, inaccurate records, and inconsistent measurement undermine statistical analysis validity (Osborne, 2013). Organizational cultures that prioritize seniority and tradition over evidence may resist statistical approaches to staff development decisions. Limited budgets for statistical software, training, and personnel constrain capabilities, particularly in resource-poor settings. Finally, the technical complexity of advanced statistical methods can intimidate practitioners without strong quantitative backgrounds, necessitating investment in capacity building and technical support.

METHODOLOGY

This study adopted a descriptive survey research design to examine the role of statistics on staff development and training in Federal Polytechnic, Ugep, Cross River State. The descriptive survey design was considered appropriate because it allows for systematic collection of data from a sample to describe the characteristics, opinions, and perceptions of a population regarding the phenomenon under investigation. The population of the study comprised all academic and non-academic staff of Federal Polytechnic, Ugep, totaling 285 employees according to the institution's human resource records as of the 2023/2024 academic session. This population included 168 academic staff across various departments and 117 non-academic staff in administrative and technical positions. The sample size for the study was determined using Taro Yamane's formula for finite population, which yielded 165 respondents at 95% confidence level and 5% margin of error. Proportionate stratified random sampling technique was employed to ensure adequate representation of both academic and non-academic staff categories, with 97 academic staff and 68 non-academic staff selected for the study. The instrument for data collection was a structured questionnaire titled "Statistics in Staff Development Questionnaire" designed by the researcher based on extensive literature review. The questionnaire consisted of two sections: Section A gathered demographic information about respondents including staff category, years of service, and department,

while Section B contained 30 items measuring the three study variables on a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). Ten items addressed statistical analysis in needs assessment, ten items focused on statistics in evaluation of training effectiveness, and ten items examined statistical influence on decision-making processes. The instrument was validated by three experts in educational management and measurement and evaluation who examined the items for clarity, relevance, and appropriateness. Their suggestions led to modification of ambiguous items and elimination of redundant questions. The reliability of the instrument was established through a pilot study conducted with 20 staff from Federal Polytechnic, Nekede, Imo State, who were not part of the main study. Cronbach's alpha reliability coefficient of 0.84 was obtained, indicating high internal consistency of the instrument. Data collection was carried out by the researcher with assistance from two trained research assistants over a period of four weeks. Out of 165 questionnaires distributed, 158 were correctly filled and returned, representing a response rate of 95.8%. Data collected were coded and analyzed using Statistical Package for Social Sciences version 25. Research questions were answered using mean and standard deviation, with a criterion mean of 2.50 serving as the decision benchmark: mean scores of 2.50 and above indicated agreement while scores below 2.50 indicated disagreement. The three null hypotheses were tested using chi-square test of independence at 0.05 level of significance, with the decision rule being to reject the null hypothesis if the calculated chi-square value exceeded the critical value or if the p-value was less than 0.05, otherwise the null hypothesis was accepted.

RESULTS

The results are presented in tables according to the research questions as follows:

Research Question 1: *To what extent does statistical analysis influence needs assessment for staff training programs in Federal Polytechnic, Ugep?*

Table 1: Mean Ratings of Respondents on Statistical Analysis and Needs Assessment (N=158)

S/N	Item Statement	Mean	SD	Remark
1	Statistical analysis of performance appraisal data helps identify specific training needs	3.72	0.68	High Extent
2	Surveys with statistical analysis reveal competency gaps among staff	3.65	0.74	High Extent
3	Correlation analysis between staff qualifications and job requirements identifies training priorities	3.58	0.81	High Extent
4	Descriptive statistics of staff demographics guide targeted training programs	3.69	0.71	High Extent
5	Gap analysis using statistical methods determines the magnitude of training needs	3.71	0.66	High Extent
6	Statistical trend analysis predicts future training requirements	3.62	0.79	High Extent
7	Percentage distributions help prioritize training needs across departments	3.74	0.65	High Extent
8	Statistical comparison of staff performance across units reveals training disparities	3.67	0.73	High Extent
9	Frequency tables of skill deficiencies inform training program design	3.70	0.69	High Extent
10	Mean scores of needs assessment surveys provide quantifiable training priorities	3.73	0.67	High Extent
	Cluster Mean	**3.68**	**0.71**	**High Extent**

Table 1 presents the mean ratings of respondents on the extent to which statistical analysis influences needs assessment for staff training programs. All ten items recorded mean scores above the criterion mean of 2.50, ranging from 3.58 to 3.74. The cluster mean of 3.68 with a standard deviation of 0.71 indicates that statistical analysis influences needs assessment to a high extent. The highest-rated item was "Percentage distributions help prioritize training needs across departments" (mean = 3.74), while the lowest was "Correlation analysis between staff qualifications and job requirements identifies training priorities" (mean = 3.58).

Research Question 2: *What is the role of statistics in evaluating the effectiveness of staff development programs in Federal Polytechnic, Ugep?*

Table 2: Mean Ratings of Respondents on Statistics in Evaluation of Training Effectiveness (N=158)

S/N	Item Statement	Mean	SD	Remark
11	Pre-test and post-test statistical comparisons measure learning outcomes	3.78	0.63	High Extent
12	Mean scores of participant feedback indicate training quality	3.69	0.72	High Extent
13	Statistical analysis of performance data before and after training shows effectiveness	3.76	0.65	High Extent
14	Percentage improvement calculations demonstrate training impact	3.75	0.67	High Extent
15	Correlation between training participation and productivity measures effectiveness	3.68	0.76	High Extent
16	Standard deviation analysis reveals consistency of training outcomes	3.64	0.79	High Extent
17	Statistical significance testing validates training program success	3.71	0.70	High Extent
18	Cost-benefit analysis using statistics justifies training investments	3.73	0.68	High Extent
19	Longitudinal statistical studies track sustained behavioral changes post-training	3.70	0.71	High Extent
20	Statistical benchmarking against industry standards evaluates program competitiveness	3.72	0.69	High Extent
	Cluster Mean	**3.72**	**0.70**	**High Extent**

Table 2 shows the role of statistics in evaluating the effectiveness of staff development programs. All items received mean scores above 2.50, ranging from 3.64 to 3.78. The cluster mean of 3.72 with a standard deviation of 0.70 demonstrates that statistics plays a significant role in evaluating training effectiveness to a high extent. The item with the highest mean was "Pre-test and post-test statistical comparisons measure learning outcomes" (mean = 3.78), while "Standard deviation analysis reveals consistency of training outcomes" had the lowest mean (3.64).

Research Question 3: *How does statistical data influence decision-making processes regarding staff development and training in Federal Polytechnic, Ugep?*

Table 3: Mean Ratings of Respondents on Statistical Data and Decision-Making (N=158)

S/N	Item Statement	Mean	SD	Remark
21	Statistical reports on training outcomes inform future program planning	3.70	0.69	High Extent
22	Data-driven insights from statistics guide resource allocation for training	3.68	0.73	High Extent
23	Statistical forecasts determine optimal timing for training programs	3.59	0.78	High Extent
24	Comparative statistical analysis influences selection of training vendors	3.62	0.75	High Extent
25	Statistical evidence of training ROI supports budget approval decisions	3.71	0.67	High Extent
26	Trend analysis using statistics shapes long-term staff development strategies	3.66	0.72	High Extent
27	Statistical dashboards provide real-time information for management decisions	3.58	0.80	High Extent
28	Regression analysis results predict success of proposed training interventions	3.61	0.76	High Extent
29	Statistical segmentation of staff influences customization of training approaches	3.67	0.71	High Extent
30	Quantitative data from statistical analysis reduces subjective bias in decisions	3.69	0.70	High Extent
	Cluster Mean	**3.65**	**0.73**	**High Extent**

Table 3 presents findings on how statistical data influences decision-making processes regarding staff development and training. All items had mean scores above the criterion mean, ranging from 3.58 to 3.71. The cluster mean of 3.65 with a standard deviation of 0.73 indicates that statistical data influences decision-making to a high extent. The highest-rated item was "Statistical evidence of training ROI supports budget approval decisions" (mean = 3.71), while the lowest-rated were items 23 and 27 with means of 3.59 and 3.58 respectively.

Test of Hypotheses

Hypothesis 1: There is no significant relationship between statistical analysis and needs assessment for staff training programs in Federal Polytechnic, Ugep.

Table 4: Chi-Square Test of Relationship between Statistical Analysis and Needs Assessment

Variables	N	df	χ^2 Calculated	χ^2 Critical	p-value	Decision
Statistical Analysis & Needs Assessment	158	9	47.32	16.92	0.000	Rejected

Table 4 shows the chi-square test results for the relationship between statistical analysis and needs assessment. With a calculated chi-square value of 47.32, which exceeds the critical value of 16.92 at 9 degrees of freedom and 0.05 level of significance, and a p-value of 0.000 ($p < 0.05$), the null hypothesis was rejected. This indicates that there is a significant relationship between statistical analysis and needs assessment for staff training programs in Federal Polytechnic, Ugep.

Hypothesis 2: There is no significant relationship between the use of statistics and the evaluation of staff development program effectiveness in Federal Polytechnic, Ugep.

Table 5: Chi-Square Test of Relationship between Statistics Use and Program Evaluation

Variables	N	df	χ^2 Calculated	χ^2 Critical	p-value	Decision
Statistics Use & Program Evaluation	158	9	52.18	16.92	0.000	Rejected

Table 5 presents the chi-square test examining the relationship between statistics use and evaluation of training effectiveness. The calculated chi-square value of 52.18 exceeded the critical value of 16.92 at 9 degrees of freedom and 0.05 significance level, with a p-value of 0.000 ($p < 0.05$). Consequently, the null hypothesis was rejected, indicating a significant relationship between the use of statistics and the evaluation of staff development program effectiveness.

Hypothesis 3: Statistical data does not significantly influence decision-making processes regarding staff development and training in Federal Polytechnic, Ugep.

Table 6: Chi-Square Test of Influence of Statistical Data on Decision-Making

Variables	N	df	χ^2 Calculated	χ^2 Critical	p-value	Decision
Statistical Data & Decision-Making	158	9	44.67	16.92	0.000	Rejected

Table 6 displays results of the chi-square test on the influence of statistical data on decision-making processes. The calculated chi-square value of 44.67 was greater than the critical value of 16.92 at 9 degrees of freedom and 0.05 level of significance, with a p-value of 0.000 ($p < 0.05$). The null hypothesis was therefore rejected, demonstrating that statistical data significantly influences decision-making processes regarding staff development and training.

DISCUSSION OF FINDINGS

The finding from research question one revealed that statistical analysis influences needs assessment for staff training programs to a high extent (mean = 3.68). This finding aligns with the position of Gupta et al. (2007) who emphasized that systematic data collection and statistical analysis enable organizations to identify performance gaps with precision rather than relying on subjective impressions. The high mean scores across all items suggest that respondents recognize the value of statistical methods in quantifying training needs, prioritizing interventions, and targeting resources effectively. This corroborates the work of Owan (2019) in Cross River State, which demonstrated that statistical needs assessment improved training program relevance by identifying specific competency deficits requiring intervention. The finding is particularly significant given that percentage distributions and mean scores of needs assessment surveys

were rated highest, indicating preference for straightforward statistical techniques that communicate priorities clearly to decision-makers.

The hypothesis testing confirmed a significant relationship between statistical analysis and needs assessment ($\chi^2 = 47.32$, $p < 0.05$), supporting the rejection of the null hypothesis. This statistical significance validates the theoretical proposition that evidence-based approaches to needs assessment outperform intuitive methods. The finding is consistent with research by Brown and Sitzmann (2011) which found that organizations employing statistical gap analysis achieved better alignment between training programs and organizational requirements. The implication is that Federal Polytechnic, Ugep can enhance the relevance and efficiency of its training programs by institutionalizing statistical needs assessment procedures. This would involve systematic collection of performance data, regular surveys of staff development needs, and application of appropriate statistical techniques to analyze and prioritize identified needs.

For research question two, the study found that statistics plays a significant role in evaluating training effectiveness to a high extent (mean = 3.72). This finding resonates with Kirkpatrick and Kirkpatrick's (2016) evaluation framework, which emphasizes quantitative measurement across multiple levels of training outcomes. The high ratings for pre-test and post-test comparisons (mean = 3.78) reflect widespread recognition of experimental and quasi-experimental designs in training evaluation, consistent with methodological recommendations by Phillips and Phillips (2016). The finding that cost-benefit analysis using statistics justifies training investments (mean = 3.73) supports the arguments of Becker et al. (2009) regarding the importance of demonstrating financial returns on training expenditures to secure continued stakeholder support.

The significant relationship between statistics use and program evaluation ($\chi^2 = 52.18$, $p < 0.05$) reinforces the critical role of quantitative methods in determining training effectiveness. This finding addresses the gap identified by Chiekezie et al. (2017), who noted that only 23% of Nigerian tertiary institutions systematically calculated training ROI. The statistical significance suggests that when institutions apply rigorous statistical evaluation methods, they gain clearer insights into which programs work, for whom, and under what conditions. This evidence-based approach to evaluation can transform training from an act of faith into a strategic investment with measurable returns, as advocated by Salas et al. (2012) in their comprehensive review of training effectiveness research.

The third research question revealed that statistical data influences decision-making processes regarding staff development to a high extent (mean = 3.65). This finding supports the evidence-based management paradigm articulated by Pfeffer and Sutton (2006), which posits that decisions grounded in empirical data consistently outperform those based on intuition or organizational politics. The high rating for statistical evidence of training ROI supporting budget approval decisions (mean = 3.71) is particularly noteworthy, as it demonstrates how quantitative data can strengthen the business case for staff development in resource-constrained environments. This aligns with Davenport and Harris's (2017) observation that analytics-driven organizations make superior strategic choices by reducing uncertainty and bias.

The significant influence of statistical data on decision-making ($\chi^2 = 44.67$, $p < 0.05$) confirmed through hypothesis testing validates the assertion by Bersin (2013) that predictive analytics transforms human resource management from reactive to proactive. The finding suggests that when decision-makers have access to reliable statistical information about training needs, program effectiveness, and projected outcomes, they can allocate resources more strategically and design interventions more precisely. This is consistent with research by Akpan (2014) which found that Nigerian polytechnics adopting data-driven decision-making achieved better alignment between training programs and institutional strategic objectives. The implication is that investing in statistical capacity and information systems can yield substantial returns through improved decision quality.

However, the study also reveals areas requiring attention. The relatively lower ratings for advanced statistical techniques such as regression analysis (mean = 3.61) and statistical dashboards (mean = 3.58) suggest that while respondents appreciate basic statistical applications, there may be limited exposure to or understanding of more sophisticated analytical methods. This finding echoes concerns raised by Okwudishu (2015) about inadequate HR information systems in Nigerian polytechnics and by Adewale

and Bakare (2014) regarding insufficient statistical training in HR curricula. The gap between appreciation of statistical principles and application of advanced techniques points to capacity development needs that must be addressed to fully leverage statistics for staff development.

The consistently high mean scores across all three variables examined in this study provide compelling evidence that statistics is not merely a technical tool but a fundamental enabler of effective staff development management. This holistic view of statistical application, spanning needs assessment, evaluation, and decision-making, reflects the systems perspective advocated by Senge (2006), which emphasizes interconnections between organizational elements. The findings suggest that optimal results are achieved when statistical methods are integrated throughout the staff development cycle rather than applied piecemeal to isolated activities.

CONCLUSION

This study has established that statistics plays a crucial and multifaceted role in staff development and training at Federal Polytechnic, Ugep, Cross River State. Statistical analysis significantly influences needs assessment processes, enabling the institution to identify training priorities based on empirical evidence rather than subjective judgment. The application of statistical methods in evaluating training effectiveness provides quantifiable measures of program impact, justifies investments in staff development, and facilitates continuous improvement of training interventions. Furthermore, statistical data exerts substantial influence on decision-making processes, enhancing the quality and objectivity of choices regarding resource allocation, program design, and strategic planning for human capital development.

The significant relationships confirmed through hypothesis testing underscore the indispensability of statistical approaches in optimizing staff development outcomes. Organizations that embrace data-driven methodologies in their human resource development initiatives are better positioned to maximize returns on training investments, demonstrate accountability to stakeholders, and achieve sustainable improvements in staff competencies. However, realizing the full potential of statistics in staff development requires addressing capacity gaps, investing in appropriate technology infrastructure, and fostering a culture that values evidence-based practice.

RECOMMENDATIONS

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

1. Federal Polytechnic, Ugep should establish a dedicated statistical unit within the human resource department to coordinate data collection, analysis, and reporting for all staff development activities.
2. The institution should invest in modern statistical software and human resource information systems to facilitate efficient data management and sophisticated analytical capabilities for staff development planning and evaluation.
3. Regular training programs on statistical methods and data analytics should be organized for human resource personnel and managers involved in staff development to enhance their capacity to apply statistical tools effectively.
4. A comprehensive database of staff competencies, training participation, and performance outcomes should be developed and maintained to support longitudinal statistical studies of training effectiveness and inform evidence-based decision-making.
5. The institution should adopt standardized statistical protocols for needs assessment, including mandatory use of surveys, performance gap analysis, and trend forecasting before designing any staff development program.
6. Evaluation of all training programs should incorporate rigorous statistical methods including pre-test and post-test comparisons, return on investment calculations, and longitudinal impact assessments with findings documented and disseminated.
7. Decision-making processes regarding staff development budgets, program approval, and resource allocation should be required to include statistical evidence and data-driven justifications to enhance transparency and optimize outcomes.

8. The institution should establish partnerships with statistics departments and research centers to access technical expertise for advanced analytical projects and to stay current with emerging statistical techniques applicable to human resource development.

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