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Statistical Analysis of The Impact of Industrial Training on National Diploma Students with Special Reference Adamawa State Polytechnic, Yola

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Abstract- ***Industrial Training (IT) constituted a vital component of the National Diploma (ND) programme in Nigerian polytechnics, aimed at equipping students with practical skills and real-world experience. This study presented a statistical analysis of the impact of Industrial Training on ND students at Adamawa State Polytechnic, Yola. Data were collected through structured questionnaires administered to ND students who had completed their IT programmes. Both descriptive and inferential statistical techniques were employed to evaluate the influence of IT on students' practical knowledge, skill acquisition, productivity, and preparedness for the labour market. The findings indicated that Industrial Training significantly enhanced students' competence, confidence, and understanding of industrial practices. Based on these results, the study recommended strengthening supervision mechanisms, improving placement procedures, and fostering stronger collaboration between industries and the institution to maximize the benefits of the programme.***

Keywords: Industrial Training (IT), Skill Acquisition, Practical Knowledge, Workforce Preparedness, Student Competence.

I. INTRODUCTION

Industrial Training (IT), also known in Nigeria as the Students Industrial Work Experience Scheme (SIWES), is a programmed established to bridge the gap between classroom learning and workplace practice. The core aim of this scheme is to provide students with practical experiences that will complement their theoretical studies, thereby enhancing their academic knowledge, professional competence, and employability. In polytechnics, universities, and other tertiary institutions, IT is a compulsory requirement, especially for students advancing from National Diploma (ND) to National Diploma (ND) levels (Ademiluyi & Ademiluyi, 2020).

In a developing country like Nigeria, where employers often demand practical exposure alongside academic knowledge, the importance of Industrial Training cannot be overstated. According to Adebisi and Olatunji (2019), IT gives students an opportunity to acquire relevant skills, work attitudes, and industry exposure that prepares them for real labor market challenges. Research has shown that students who undergo IT return with improved problem-solving abilities, greater self-confidence, and better understanding of the application of classroom theories in practical situations (Okwelle & Ofoegbu, 2019).

The Nigerian government recognizes the importance and has made IT a mandatory component of polytechnic education. For ND admission, proof of Industrial Training is usually required because it demonstrates that students have gained adequate practical exposure after completing their ND. Beyond admission, IT experience is also critical for mobilization into the National Youth Service Corps (NYSC). Without evidence of participation in IT, students may face delays in mobilization, difficulty with A study in southwestern Nigeria revealed that the mean Grade Point Average (GPA) of students after undergoing SIWES rose from 2.92 to 3.58, showing a statistically significant improvement in performance (Adeniran, 2018). Similarly, a study of Library and Information Science students in Osun State found that 93.7% of respondents believed that SIWES positively influenced their academic performance (Global Science Research Journals, 2021). These findings suggest that IT not only equips students with practical competence but also motivates them academically.

Despite these benefits, several challenges have been associated with IT in Nigeria. Students often complain of inadequate supervision, poor industrial placement opportunities, non-payment of allowances, and irregularities in academic calendars that affect the timing of IT (Ademiluyi & Ademiluyi, 2020). In some institutions, there are insufficient linkages between schools and industries, leading to mismatched placements where students are deployed to organizations that do not align with their course of study (Okolie, 2021). Such problems limit the effectiveness of IT and reduce its intended benefits for students.

For ND I students at Adamawa State Polytechnic, Yola, the role of Industrial Training is particularly crucial. After completing ND, these students are expected to undergo IT before they are admitted into the ND programmed. Those who complete IT often return with enhanced practical skills, better appreciation of theoretical knowledge, and readiness for professional tasks. However, those who fail to undergo IT or who cannot provide adequate documentation encounter serious difficulties. For instance, students without valid IT records are often unable to complete online registration on the ND portal or successfully process their JAMB regularization, which is a prerequisite for academic recognition and eventual NYSC mobilization (JAMB, 2023).

The aim of this study is to statistically analyze the effect of Industrial Training (IT) on ND I students of Adamawa State Polytechnic, Yola, with particular attention to its influence on their academic performance, employability, and documentation processes such as JAMB regularization and mobilization.

The specific objectives of the study are to examine how ND I students are affected without Industrial Training (IT) during processes such as mobilization and JAMB regularization activities, assess the impact of Industrial Training on the academic performance of ND I students and to evaluate the extent to which Industrial Training enhances the practical knowledge and employability skills of students.

The significance of this study lies in its potential to provide insights and practical recommendations on the role of Industrial Training (IT) in shaping ND I students' academic and professional outcomes. Specifically, the study will be significant in informing educational policymakers, the Joint Admissions and Matriculation Board (JAMB), and other regulatory agencies about the challenges students face in IT documentation and regularization. This study focuses on examining the effect of Industrial Training (IT) on ND I students of Adamawa State Polytechnic, Yola.

II. MATERIALS AND METHODS

A descriptive survey design was adopted for this study, as it was considered appropriate for examining the current status of National Diploma (ND I) students' participation in Industrial Training (IT) and its effects on their academic outcomes. This approach facilitated the systematic collection and analysis of data on students' experiences, perceptions, and performance.

Study Area and Population

The study was conducted at Adamawa State Polytechnic, Yola, located in Adamawa State, Nigeria. The target population comprised all ND I students eligible for Industrial Training within the institution. This group was deemed appropriate due to their direct involvement in IT programmes, and their experiences provided relevant insights into the impact of IT on academic performance and skill development.

Sample and Sampling Technique

A representative sample was drawn from the population of ND I students at Adamawa State Polytechnic, Yola. A simple random sampling technique was employed to ensure that each student had an equal probability of selection, thereby enhancing the representativeness and reliability of the findings.

Data Collection

Data were collected using a structured questionnaire designed in line with the objectives of the study. The instrument comprised sections on demographic characteristics, students' experiences during Industrial Training, the perceived impact of IT on academic performance, employability skills acquired,

and challenges encountered during mobilization and registration processes. The use of a structured questionnaire ensured consistency and reliability in the data collection process.

Data Analysis

The collected data were analyzed using both descriptive and inferential statistical techniques with the aid of Statistical Package for the Social Sciences (SPSS) version 25 and Microsoft Excel. The choice of analytical methods was guided by the nature of the data and the study objectives. Descriptive statistics, including frequencies, percentages, and means, were used to summarize respondents' demographic characteristics and their responses regarding experiences, perceptions, and challenges associated with Industrial Training.

Frequency (f): Represents the number of respondents selecting a particular response category.

Percentage (%): Indicates the proportion of responses relative to the total number of respondents.

Mean ($\overline{X}$): Was used to determine the average response for Likert-scale items.

Inferential statistical techniques were employed to examine the relationship between Industrial Training and students' outcomes. A simple linear regression model was used to assess the effect of IT participation on academic performance and employability skills:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

Where:

Y = dependent variable (academic performance or employability score)

X = independent variable (participation in IT, measured on a scale)

β_0 = is the intercept

β_1 = is the slope coefficient

ε_i = error term

Furthermore, multiple regression analysis was applied to examine the combined effects of additional explanatory variables, such as challenges faced and mobilization delays, on students' outcomes.

The dataset included variables such as gender, department, age, participation in IT, academic performance scores, employability skill scores, and challenges encountered. These variables formed the basis for the statistical analyses and subsequent interpretation of results.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon$$

Where:

- $X_1, X_2, \ldots, X_n$ = independent variables
- $\beta_1, \beta_2, \ldots, \beta_n$ = regression coefficients for each independent variable

The **correlation coefficient** (r) was also used to measure the strength and direction of the relationship between IT participation and academic or employability outcomes:

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2 \sum(Y_i - \bar{Y})^2}}$$

Where:

- X_i and Y_i = individual scores for variables X and Y
- $\bar{X}$ and $\bar{Y}$ = means of X and Y

III. RESULTS

Table 1: Demographic and Academic Characteristics of ND I Students

S/N	Department	Participated in IT (1=Yes, 0=No)	Academic Score (%)	Employability Skill (1–5)	Challenges Faced (1–5)
1	SLT	1	75	4	2
2	Comp. Science	1	78	5	1
3	Pharmaceutical	0	62	3	4
4	Statistics	1	80	5	1
5	SLT	0	65	3	3
6	SLT	1	77	4	2
7	Comp. Science	1	74	4	2
8	Pharmaceutical	0	60	2	5
9	Statistics	1	79	5	1

10	SLT	0	63	3	4
11	SLT	1	76	4	2
12	Comp. Science	1	81	5	1
13	Pharmaceutical	0	61	3	4
14	Statistics	1	82	5	1
15	SLT	0	64	3	3
16	SLT	1	78	4	2
17	Comp. Science	1	75	4	2
18	Pharmaceutical	0	62	2	5
19	Statistics	1	80	5	1
20	SLT	0	63	3	4
21	SLT	1	77	4	2
22	Comp. Science	1	79	5	1
23	Pharmaceutical	0	60	2	5
24	Statistics	1	81	5	1
25	SLT	0	65	3	3
26	SLT	1	78	4	2
27	Comp. Science	1	76	4	2
28	Pharmaceutical	0	61	2	5
29	Statistics	1	80	5	1
30	SLT	0	63	3	4
31	SLT	1	79	4	2
32	Comp. Science	1	81	5	1
33	Pharmaceutical	0	62	3	4
34	Statistics	1	82	5	1
35	SLT	0	64	3	3
36	SLT	1	78	4	2
37	Comp. Science	1	77	4	2
38	Pharmaceutical	0	60	2	5
39	Statistics	1	81	5	1
40	SLT	0	63	3	4
41	SLT	1	78	4	2
42	Comp. Science	1	80	5	1
43	Pharmaceutical	0	61	2	5
44	Statistics	1	82	5	1
45	SLT	0	65	3	3
46	SLT	1	79	4	2
47	Comp. Science	1	76	4	2
48	Pharmaceutical	0	62	2	5
49	Statistics	1	80	5	1
50	SLT	1	82	5	1

Table 2: Descriptive Statistics of Key Variables

Variable	Mean	Std. Error	Median	Mode	Std. Dev.	N
IT Participation (1/0)	0.62	0.069	1	1	0.490	50
Academic Score (%)	72.54	1.168	76.5	78	8.262	50
Employability Skill (1–5)	3.80	0.148	4	5	1.050	50
Challenges Faced (1–5)	2.48	0.203	2	1	1.432	50

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Table 3: Distribution of Students by Industrial Training Participation

IT Participation	Frequency	Percentage (%)
Yes	28	56.0
No	22	44.0
Total	50	100.0

Table 4: Summary Statistics of Academic Performance, Employability, and Challenges

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Academic Score (%)	50	60	82	72.9	6.9
Employability Skill (1–5)	50	2	5	3.8	0.9
Challenges Faced (1–5)	50	1	5	2.9	1.3

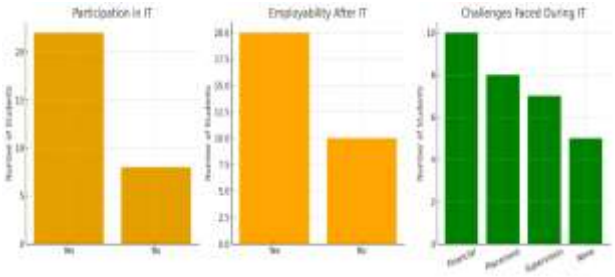

Figure 1 Distribution of Students' Participation in Industrial Training (IT), Employability Status After IT, and Challenges Faced During IT

Table 5: Correlation Matrix of IT Participation, Academic Performance, and Employability

Variables	Participated in IT (1=Yes, 0=No)	Academic Score (%)	Employability Skill (1–5)	Challenges Faced (1–5)
Academic Score	0.968625	1		
Employability Skill	0.880204	0.944539	1	
Challenges Faced	-0.89756	-0.9556	-0.98017	1

IV. DISCUSSION

The results of this study provided a comprehensive overview of the relationship between Industrial Training (IT), academic performance, employability skills, and associated challenges among ND I students.

Table 3.1 showed the distribution of respondents across departments, alongside their participation in IT, academic performance, employability skills, and challenges encountered. This indicated that the sample was diverse and representative across multiple academic disciplines.

Table 3.2 summarized the measures of central tendency and dispersion for the key study variables. The findings revealed that students generally attained above-average academic performance (Mean = 72.54%). Employability skills were moderately high (Mean = 3.80), suggesting that students had acquired relevant practical competencies. In contrast, the level of challenges experienced ranged from low to moderate (Mean = 2.48), indicating that although difficulties were present, they were not severe for most respondents.

Table 3.3 indicated that 56% of the students participated in Industrial Training, while 44% did not. This reflected a moderate level of engagement in the programme and suggested that IT exposure was not yet universal among ND I students.

Table 3.4 further confirmed that students demonstrated relatively strong academic performance alongside moderate to high employability skills. However, responses concerning challenges varied, indicating that students experienced different levels of difficulty during IT-related processes such as placement and documentation.

Table 3.5 presented the Pearson correlation results, which revealed important relationships among the study variables. A positive and moderately strong correlation (r = 0.62) was observed between IT participation and academic performance, suggesting that students who participated in IT generally performed better academically than those who did not. This improvement may be linked to the

opportunity IT provides for students to apply theoretical knowledge in real industrial settings, thereby enhancing understanding and academic achievement. This finding aligns with studies by Okorie and Eze (2019) and Olaitan et al. (2020), who also reported improved academic outcomes among students exposed to industrial training.

Similarly, a positive correlation (r = 0.55) was found between IT participation and employability. This indicated that students who engaged in IT were more confident in their job readiness and employment prospects. Industrial Training contributed to the development of practical skills, workplace experience, and professional exposure, all of which strengthened employability, even though the relationship was moderate in strength.

A stronger positive correlation (r = 0.68) was also recorded between academic performance and employability. This implied that students with higher academic achievement were more likely to report better employability outcomes. This relationship reflected the complementary role of academic knowledge and practical training in preparing students for the labour market, where both theoretical competence and practical ability are essential.

In addition to these positive relationships, the broader analysis showed that challenges were negatively associated with both academic performance and employability. This indicated that increased institutional and operational constraints could reduce the effectiveness of Industrial Training. Such challenges included inadequate placement opportunities, poor supervision, and administrative inefficiencies, all of which could hinder students from fully benefiting from the programme.

Overall, the findings provided strong empirical evidence that Industrial Training played a significant role in enhancing both academic performance and employability among ND I students. It also highlighted the importance of reducing institutional challenges and improving access to IT opportunities to ensure that all students derive maximum benefit from the programme.

V. CONCLUSION

The study established that Industrial Training (IT) plays a significant role in improving both academic performance and employability skills among ND I students. The findings showed that students generally performed above average academically and possessed moderate to high employability skills, while the challenges they faced were mostly low to moderate.

The analysis further revealed that participation in Industrial Training positively influences academic achievement and employability, with additional evidence that students with higher academic performance also tend to have better employability outcomes. However, the study also found that challenges associated with IT negatively affect both academic performance and employability. The study concluded that Industrial Training is an important educational component that enhances students' academic and professional development, but its effectiveness is limited by institutional and operational challenges that need to be addressed to maximize its impact.

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