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# **Utilization of Science Equipment and Students' Self-Efficacy in Basic Science in Ekiti State Secondary Schools**

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#### Abstract

The study investigated utilization of science equipment and students' self-efficacy in Basic Science in Ekiti State Secondary Schools. The descriptive research design of the survey type was adopted in the study. The population of this study consisted of all the teachers and students of all secondary schools in Ekiti State. The sample for this study consisted of 450 students and 30 teachers which were selected from 30 secondary schools in Ekiti State. The sample was selected through multi stage sampling procedure. Two research instruments were used to collect relevant data for the study. These were Basic Science Equipment Checklist (BSEC) and Students' Self-Efficacy Scale (SSES). The face and content validity of each instrument were done by experts in Tests and Measurement and Science Education to determine the level of appropriateness of the instruments. The reliability of the instruments was established through the test re-test method. The scores of the two tests (i.e. test and re-test) were thereafter correlated using Pearson's Product Moment Correlation. Reliability Coefficient 0.79 and 0.83 were obtained for BSEC and SSES respectively. The researcher personally administered the two instruments. The data collected for this study were analyzed using descriptive and inferential statistics. The findings of this study revealed that the level of students' self-efficacy in Basic Science in public secondary schools in Ekiti State is moderate. Furthermore, availability, adequacy and extent of utilization of science equipment have no influence on students' self-efficacy in Basic Science. It was recommended among others that Basic Science teachers should make requisitions for equipment for teaching and ensure proper utilization.

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#### Introduction

Basic Science is one of the core subjects offered at the levels of Nigerian education system. It is an important subject that has positive impact on human's life and nation's economy. Rudraiah (2008) stated that the Basic Science is the backbone of applied science or foundation on which all ancient and modern technology depends. Awechie (2011) stated that Basic Science is a pure or fundamental science. It can be defined as man's systematic effort to understand natural phenomenon. It comprises of five disciplines which are Physics, Chemistry, Mathematics, Biology and Basic Medical Science.

Access to adequate science equipment can impact students' learning opportunities as well as affect their self-efficacy. Self-efficacy refers to a student's confidence in his or her ability to achieve specific academic tasks (Brown, Lent & Larkin, 2009). The belief that one can successfully meet demands of performing his/her tasks is what Bandura (2001) calls selfefficacy beliefs. Self-efficacy is defined as the belief a person has about his or her capabilities to produce the desired level of performance. In view of the above, the study investigated utilization of science equipment and students' self-efficacy in Basic Science in Ekiti State Secondary Schools. The study will specifically examined:

- i. the level of students' self-efficacy in Basic Science in public secondary schools;
- ii. the influence of availability of science equipment on students' self-efficacy in Basic Science in public secondary schools;
- iii. the influence of adequacy of science equipment on students' self-efficacy in Basic Science in public secondary schools; and
- iv. the influence of utilisation of science equipment on students' self-efficacy in Basic Science in public secondary schools.

#### **Research Question**

The following research question was raised for the study

1. What is the level of students' self-efficacy in Basic Science in public secondary schools in Ekiti State?

#### **Research Hypotheses**

The following research hypotheses were formulated for this study:

- 1. Availability of science equipment will not significantly influence students' self-efficacy in Basic Science in public secondary schools in Ekiti State.
- 2. Adequacy of science equipment will not significantly influence students' self-efficacy in Basic Science in Public secondary schools in Ekiti State.
- 3. Utilization of science equipment will not significantly influence students' self-efficacy in Basic Science in public secondary schools in Ekiti State.

#### Methodology

The descriptive research design of the survey type was adopted in the study. The population of this study consisted of all the teachers and students of all secondary schools in Ekiti State. The population of the study (Source: Ekiti State Ministry of Education, 2021), were 15,256 Junior Secondary School Class Two (JSSII) students and 260 Basic Science teachers in 203 public secondary schools in Ekiti State. The sample for this study consisted of 450 students and 30 teachers which were selected from 30 secondary schools in Ekiti State. The sample was selected through multi stage sampling procedure.

Two research instruments were used to collect relevant data for the study. These were Basic Science Equipment Checklist (BSEC) and Students' Self-Efficacy Scale (SSES). Basic Science Equipment Checklist BSEC consisted of section A and B. Section A consisted of bio-



data of the respondents which include the name of school, location of school, sex, Age, qualification, Area of Specialization, year of experience, Laboratory, Laboratory Condition, while section B contained 55 items. Students' Self-Efficacy Scale (SSES), consisted of section A and B. Section A consisted of bio-data of the respondents which include the name of school, class, sex, age. Section B consisted of 20 items with three options, Not True (NT), Partially True (PT), and Absolutely True (AT).

The face and content validity of each instrument were done by experts in Tests and Measurement and Science Education to determine the level of appropriateness of the instruments in measuring what they purport to measure and ensure that the instruments contained the appropriate items that could actually produce the intended responses. Expert's judgment was used in determining the content validity. The experts took time to check the extent to which the items of the instrument were representative of the contents. The reliability of the instruments was established through the test re-test method. The instruments were administered on 30 Junior Secondary School Class Two (JSSII) students and four Basic Science teachers selected from four schools that would not be used for the study. After two weeks, the same instruments were re-administered on the same set of sample. The scores of the two tests (i.e. test and re-test) were thereafter correlated using Pearson's Product Moment Correlation. Reliability Coefficient 0.79 and 0.83 were obtained for BSEC and SSES respectively.

The researcher personally administered the two instruments. The data collected for this study were analyzed using descriptive and inferential statistics.

#### Results

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**Question 1:** What is the level of students' self-efficacy in Basic Science in public secondary schools in Ekiti State?

In analyzing the question, respondents' scores on self-efficacy scale were used. Frequency counts, percentages, mean and standard deviation score were used to illustrate the responses to items 1 - 20 in section B of Students' Self-Efficacy Scale (SSES). To determine the level of students' self-efficacy in Basic Science (low, moderate and high), the mean score and standard deviation of the responses were used. The low level of students' self-efficacy in Basic Science was determined by subtracting the standard deviation from the mean score (43.31 - 4.40 = 38.91). The moderate level of students' self-efficacy in Basic Science was determined by the mean score (43.31) while the high level of students' self-efficacy in Basic Science was determined by adding the mean score and standard deviation (43.31 + 4.40 = 47.71). Therefore, low level of students' self-efficacy in Basic Science starts from 20.00 to 38.91, the moderate level starts from 38.92 to 47.70 and the high level of students' self-efficacy in Basic Science is from 47.71 to 60.00. The level of students' self-efficacy in Basic Science in secondary schools in Ekiti State is presented in table 1 and figure i.

Level of students' self-efficacy in Basic Science	No of Respondents	Percentage
Low (20.00 – 38.91)	59	13.11
Moderate (38.92 – 47.70)	328	72.89
High (47.71 – 60.00)	63	14.00
Total	450	100

Table 1: Level of Students' Self-efficacy in Basic Science in Secondary Schools in Ekiti State

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Table 1 revealed the levels of students' self-efficacy in Basic Science in secondary schools in Ekiti State. The result showed that out of 450 respondents from 30 schools, 59 respondents representing 13.11 percent had low self-efficacy in Basic Science. Those whose self-efficacy in Basic Science is at moderate level were 328 respondents representing 72.89 percent while 63 respondents representing 14.0 percent had high self-efficacy in Basic Science in Secondary schools was moderate. Figure i further revealed the level of students' self-efficacy in Basic Science in Secondary Science.



Figure i: Levels of students' self-efficacy in Basic Science in secondary schools in Ekiti State.

#### **Testing of Hypotheses**

**Hypothesis 1:** Availability of science equipment will not significantly influence students' selfefficacy in Basic Science in Public secondary schools in Ekiti State.

**Table 2:** Two-way Analysis of Variance (ANOVA) for influence of availability of science equipment on students' self-efficacy in Basic Science

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	386.189 <sup>a</sup>	6	64.365	17.092	.000*
Intercept	20254.816	1	20254.816	5378.764	.000*
Availability	6.859	2	3.429	.911	.416

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Self-Efficacy	285.170	2	142.585	37.864	.000*
Availability * Self-Efficacy	.415	2	.207	.055	.947
Error	86.611	23	3.766		
Total	59082.000	30			
Corrected Total	472.800	29			

a. R Squared = .817 (Adjusted R Squared = .769) \* P < 0.05

From Table 2, the p-value (0.947) is greater than 0.05 level of significant i.e. P (0.947) >0.05. This led to the non-rejection of the null hypothesis. This means that availability of science equipment will not significantly influence students' self-efficacy in Basic Science in Public secondary schools in Ekiti State. By implication, availability of science equipment has no influence on students' self-efficacy in Basic Science.

**Hypothesis 2:** Adequacy of science equipment will not significantly influence students' selfefficacy in Basic Science in public secondary schools

**Table 3:** Two-way Analysis of Variance (ANOVA) for influence of adequacy of science equipment on students' self-efficacy in Basic Science

Source	Sum of Squares	df	Mean Square	F	Siσ
Corrected Model	302 01 8a	с 5	78 584	23 610	000
	572.710	5	70.304	23.010	.000
Intercept	20595.467	1	20595.467	6187.740	.000
Adequacy	5.389	2	2.695	.810	.457
Self-Efficacy	336.600	2	168.300	50.564	.000
Adequacy * Self-Efficacy	2.314	1	2.314	.695	.413
Error	79.882	24	3.328		
Total	59082.000	30			
Corrected Total	472.800	29			

a. R Squared = .831 (Adjusted R Squared = .796) \* P < 0.05

From Table 3, the p-value (0.413) is greater than 0.05 level of significant i.e. P (0.413) >0.05. This led to the non-rejection of the null hypothesis. This means that adequacy of science equipment will not significantly influence students' self-efficacy in Basic Science in public secondary schools in Ekiti State. By implication, adequacy of science equipment has no influence on students' self-efficacy in Basic Science.

**Hypothesis 3:** Utilization of science equipment will not significantly influence students' selfefficacy in Basic Science in public secondary schools



Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	399.633ª	6	66.606	20.938	.000
Intercept	24542.538	1	24542.538	7714.966	.000
Utilization	16.425	2	8.213	2.582	.097
Self-Efficacy	308.597	2	154.298	48.504	.000
Utilization * Self-Efficacy	3.898	2	1.949	.613	.551
Error	73.167	23	3.181		
Total	59082.000	30			
Corrected Total	472.800	29			

**Table 4:** Two-way Analysis of Variance (ANOVA) for influence of utilization of science equipment on students' self-efficacy in Basic Science

a. R Squared = .845 (Adjusted R Squared = .805)

From Table 4, the p-value (0.551) is greater than 0.05 level of significant i.e. P (0.551) >0.05. This led to the non-rejection of the null hypothesis. This means that level of utilization of science equipment will not significantly influence students' self-efficacy in Basic Science in public secondary schools in Ekiti State. By implication, level of utilization of science equipment has no influence on students' self-efficacy in Basic Science.

#### Discussion

It was also revealed that the level of students' self-efficacy in Basic Science in public secondary schools in Ekiti State was moderate. It was revealed that availability and adequacy of science equipment did not significantly influenced students' self-efficacy in Basic Science in Public secondary schools in Ekiti State. The reason for the result might be due to the challenges often faced in doing practical even when the science equipment are moderately available. Some teachers separate science lessons into practical and theory lessons so as to shift practical work until the second term of the final year. According to Ekpo (2009), any effort to separate Science into practical and theory lesson account to perpetuating the dichotomy and this is antithesis of what science is. The researcher could infer that the availability of any educational resources such as science equipment plays a significant role if and only if it is effectively used during teaching – learning process.

It was also revealed that level of utilization of science equipment did not significantly influenced students' self-efficacy in Basic Science in public secondary schools. The researcher is of the opinion that if the equipment is not maximally used it may not influence students' self-efficacy in Basic Science. This seems to be in line and consistent with findings of Lewin (2000) and Ari and Bayram (2012) who found out that extent of utilization of science equipment did not significantly influenced students' self-efficacy. The researcher infer that when science equipment is available and effectively utilized, science students with a strong sense of efficacy tend to challenge themselves with difficult tasks, and become intrinsically motivated. The adequacy and use of educational resources like science equipment enhance the effectiveness of teachers' lesson and understanding of abstract ideas and improve performance of the students.



#### Conclusion

Sequel to the findings of this study, it was concluded that the level of students' selfefficacy in Basic Science in public secondary schools in Ekiti State is moderate. Furthermore, availability, adequacy and extent of utilization of science equipment have no influence on students' self-efficacy in Basic Science.

#### Recommendations

Based on the findings of this study, the following recommendations were made.

- 1. Government and all stakeholders in Education should assist in ensuring that adequate equipment for teaching and learning Basic Science are provided in secondary schools.
- 2. Basic Science teachers should make requisitions for equipment for teaching and ensure proper utilization

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