

Impact of laboratory facilities access in Kwara State, Nigeria on student performance in upper basic schools

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ABSTRACT

The low learning outcomes of students caused by the underutilization of science laboratory facilities in some Kwara State Upper Basic Schools need to reveal. Thus, this research aimed 1) to analyze the effect of science laboratory utilization by the teachers and their experience on the students' learning outcomes, 2) to analyze the effect of science laboratory utilization by male and female teachers on the students learning outcomes, and 3) to analyze the effect of science laboratory utilization by experienced teachers to the students' learning outcomes. It is ex post facto research with multiple linear regression analysis due to its two independent variables. This research took both public and private upper primary school teachers in Kwara State, Nigeria, as the population. Forty-seven Public and Private Upper Basic Schools in all parts of the state are taken as samples randomly in this research. There were 100 basic science teachers taken as respondents. This research reported that 1) teachers' utilization of science laboratory based on gender and experience in teaching science simultaneously influenced students' learning outcomes with value Sig. $0,00 < 0,05$, 2) the utilization of the science laboratory by the male and female teachers did not significantly influence the students' learning outcomes, with value Sig. *Equal variances assumed* $0,017 < 0,05$, and 3) the utilization of a science laboratory by experienced teachers in teaching basic science significantly influenced one student's learning outcomes.

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INTRODUCTION

According to Duban et al. (2019), the laboratory is essential function in active practicum learning. Laboratory practice enables effective, permanent, and fun learning. The practicum learning objective will be achieved when the supporting facilities facilitate all practicum needs and teachers' skills to realize the theories taught to the students (Sugianto et al., 2019).

Previous research has revealed that science teaching encounters problems from students, teachers, schools, government policy, and parents. Eya & Elechi (2015), reported that some junior secondary schools had no laboratory equipment or material to learn basic science. Some teachers had not utilized the available facilities. Farounbi (2014), elaborated that the lack of adequate laboratory facilities, teacher, and practicum manual was why the teacher had not utilized the

laboratory equipment and material.

Basic science is a fundamental part of science education that should be imparted as basic knowledge to understand science. Basic science is taught in basic primary schools, one to nine. Basic science is the main determinant of science learning outcomes in a practicum activity. Unfortunately, basic science learning as a subject in Nigeria is not supported by adequate laboratory facilities. It leads to low student learning outcomes (Amoo, 2019).

Omiko (2015), showed that the laboratory's use helps the students develop a scientific attitude in chemistry, particularly in practicum. It also develops scientific skills in students' problem-solving. There is a significant deficiency in the availability and the use of science laboratories. The less availability, misallocation, and deficiency in the use of science laboratory items lead to the wastage of resources. The less effectiveness of science laboratories and lower academic achievement (Dahar & Faize, 2012). Biology laboratory facilities are not available entirely, or where they are, they are inadequate. Moreover, the high student population does not utilize them. There was a significant relationship between the availability of biology laboratory facilities and utilization and student academic achievement (Umar & Musah, 2017). There was no assessment of science laboratory practical activities. These activities did not contribute directly to measuring students' academic performance in science (Pareek, 2019). Availability and utilization of physics laboratory equipment had a relationship with students' academic achievement (Olufunke, 2012).

The affected learning achievement is not only because the teachers utilize science laboratory facilities by the teachers but also because of the teacher's gender and experience in teaching basic science. It is supported by Adigun et al. (2015), in their research finding that even male students show less performance than female students, but it does not affect their learning outcomes. On the contrary, Abidoye, (2018) reported that the biology teacher's gender influences the students' performance in secondary school in Osun State, Nigeria.

Based on previous studies, there is still no research that combines the relationship between laboratory facilities, teachers based on gender and experience, and student learning outcomes. This research aims to know the effect of utilizing science laboratory facilities by the teacher on the student's performance in upper basic schools in Kwara State, Nigeria. Specifically, this research aims; 1) to analyze the effect of science laboratory utilization by the teachers and their experience on the students' learning outcomes, 2) to analyze the effect of science laboratory utilization by male and female teachers on the students learning outcomes, and 3) to analyze the effect of science laboratory utilization by experienced teachers to the students' learning outcomes.

METHOD

This research employed an *ex post facto* research method with multiple linear regression analysis due to its two independent variables. This research took both public and private upper basic school teachers in Kwara State, Nigeria, as the population. Kwara State has 469 Public Upper Basic schools and 362 Private Upper Basic Schools. Forty-seven Public and Private Upper Basic

Schools in all parts of the state are taken as samples randomly in this research. There were 100 basic science teachers taken as respondents.

The primary instrument in this research is a questionnaire. It is divided into sections A and B. Section A contains demographic information of the science teachers. Section B has questionnaire items about basic science teacher variables such as gender, teaching experience, academic qualification, and school type. This questionnaire uses a Likert scale ranging from Strongly Agree, Agree, Disagree, and Strongly Disagree.

The research instrument was validated by three lecturers from Ilorin University, Ilorin State, Kwara. The instrument's reliability was tested using Pearson Product Moment Correlation (PPMC) to ensure the reliability index was at 0.082. The research questions were answered using frequency count and mean statistics using SPSS 22.

The first research question is how the teachers influence the use of science laboratory facilities based on gender and experience in students learning outcomes. The analysis using a multiple linear regression test was conducted to answer it. The second research question is how the influence of utilizing science laboratory facilities by male and female teachers on students learning outcomes. The analysis using an independent sample t-test was conducted to answer the question above. The third research question is how the influence of utilizing science laboratory facilities by experienced teachers on students' learning outcomes. The analysis using an independent sample t-test was conducted to answer it.

RESULTS AND DISCUSSION

1) The Utilization of Science Laboratory Facilities by the Teachers Based on Gender and Experience on Students' Learning Outcomes

The teachers' utilization of science laboratory facilities based on gender and experience with the students' learning outcomes was analyzed using multiple linear regression. A Normality test was conducted earlier, showing that the data were normal and homogeneous. The multiple linear regression test result is presented in the Table 1.

Table 1. Multiple linear regression test

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	165.016	2	82.508	11.953	.000 ^b
	Residual	669.574	97	6.903		
	Total	834.590	99			

a. Dependent Variable: Learning Outcomes

b. Predictors: (Constant), Teaching Experience, Gender

From Table 1, the value of Sig. is $0.00 < 0.05$. It means that teachers' use of science laboratory facilities based on gender and experience in teaching basic science has a simultaneous effect on students' learning outcomes. It is supported by [Abudu & Banjoko \(2013\)](#), in their research that there is a significant correlation between the utilization of laboratory resources and students' chemistry learning achievement. That there is a significant relationship between the use of

laboratory resources with student achievement in chemistry. [Omiko \(2015\)](#), investigated laboratory learning and concluded that the implication and result of chemistry learning achievement in secondary school show that the use of the laboratory, particularly in chemistry practice, could develop the scientific skills of students' problem-solving in some points. Such as the effect of gender on learning outcomes and teachers' teaching experience.

From gender on learning outcomes, [Adigun et al. \(2015\)](#), reported that male students who showed less performance than female students do not significantly influence the learning outcomes. Contradict, [Abidoeye \(2018\)](#), investigated the effect of Biology teachers on students' performance in secondary school in Osun State, Nigeria. His finding emphasized a significant correlation between gender and students' performance.

From the teaching experience of the teachers, [Krakehl et al. \(2020\)](#), added that physics teachers' years of teaching experience have a significant effect on increasing students' achievement, compared to teachers with less experience, which will lead to low students' achievement. According to [Alamsyah et al. \(2020\)](#), teachers' teaching experience significantly influences the students learning achievement because it significantly influences the teachers professionalism. It demands that the teacher utilize all teaching and learning facilities professionally. [Nursamsu \(2021\)](#), confirmed the significant effect of teacher gender and teaching experience on students' writing scientific reports.

2) The Utilization of Science Laboratory Facility by Male and Female Teachers Toward Students' Learning Outcomes

Male and female teachers' effect of utilizing science laboratory facilities on students' learning outcomes was analyzed using an independent sample t-test. A normality test was conducted earlier, and the data was found to be normal and homogeneous. The independent sample t-test result is presented in Table 2.

Table 2. T-test on the effect of utilizing science laboratory facilities by male and female teachers on students' learning outcomes

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Learning outcomes	Equal variances assumed	1.336	.251	.918	98	.361	-.537	.585	-.624	1.699
	Equal variances not assumed			.896	82.4	.373	-.537	.599	-.655	1.730

Based on Table 2, the value of Sig. *Equal variances assumed* is $0.361 > 0.05$ and the value of Sig. *Equal variances not assumed* is $0.33 > 0.05$. It means that male and female teachers' utilization of science laboratory facilities toward the students' learning outcomes has no significant effect. It is due to male and female teachers' professionalism in utilizing the science laboratory facilities. It proves that the performance of both male and female teachers shows equal average score of students' learning outcomes. It can be seen in Table 3.

This result is similar to [Adigun et al. \(2015\)](#), that although male students perform better than

female students, it has no significant effect on their learning outcomes. Nursamsu (2021), added that no simultaneous interaction between gender and students' performance was added in his research finding. Both do not influence coincide to the ability to write a scientific report. In line with Alufohai & Ibhafidon (2015), their finding showed that students' academic achievement was influenced by the teacher's age and marital status, while the teacher's gender has no significant effect on students' academic achievement. The analysis from Gentrup & Rjosk (2018), revealed that teachers' gender gap is not substantially contributing to the students' ability in reading and counting.

Table 3. The average score of students' learning outcomes per semester based on male and female teachers' performance

Gender		Teacher's Experience	
Male	Female	1-5 years	> 5 years
80.95	80.41	80.33	81.44

On the other hand, Abidoeye (2018), affirmed a significant correlation between gender and students' academic achievement. He argued that male students perform better than female students. It is supported by Watson et al. (2019) in his finding. He found that male teachers have lower performance than females, which leads to lower students' reading ability and negatively implies to male teachers.

It can be concluded that gender has no significant contribution to students' learning outcomes. Teachers' creativity and ability to deliver the material significantly influence the students' learning outcomes. It professionally influences the teachers' utilization of science laboratory facilities that contribute to the students' learning outcomes.

3) The Utilization of Science Laboratory Facilities by Experienced Teachers on Students' Learning Outcomes

The effect of utilizing science laboratory facilities by experienced teachers on students' learning outcomes was analyzed using an independent sample t-test. A normality test was conducted earlier. The data was found normal and homogenous. The result of the independent sample t-test is presented in Table 4.

Table 4. T-test on the utilization of science laboratory facilities by experience teachers toward students' learning outcomes

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error	95% Confidence Interval	
									Lower	Upper
Learning outcomes	Equal variances assumed	,460	,049	-1,82	98	,017	-1,108	,606	-2,310	,094
	Equal variances not assumed			-1,75	59,91	,048	-1,108	,631	-2,369	,154

Based on Table 4, the value of Sig. *Equal variances assumed* is $0,017 < 0,05$ and the value of Sig. *Equal variances not assumed* is $0,048 < 0,05$. It means that the utilization of science laboratory facilities significantly affects students' learning outcomes. Alamsyah et al. (2020), elaborated that teacher's teaching experience influences the students' learning outcomes because it significantly influences the teacher's professionalism. It demands that the teacher utilize all teaching facilities professionally. In line with Krakehl et al. (2020), years of Physic teachers' teaching experience significantly influence students' learning achievement compared to teachers with less teaching experience, leading to low student learning achievement. Ladd & Sorensen (2017), found that years of teaching experienced teachers can influence students learning outcomes and behaviour. Gyeltshen (2021) added that the teachers' perception showed that higher teacher qualifications and experience positively affects students' learning achievement. Jega & Julius (2018), revealed that all teachers' qualifications and experience have a more significant effect on students learning achievement. According to Moyo et al. (2022), teachers' experience and reflection tend to support the formative assessment of higher-order thinking as a strategy for improving mathematics teaching. Raygor (2017), analysis showed a significant correlation between science material mastery factors, schedule structure, teacher's experience, and students' achievement.

CONCLUSION

Teachers' utilization of science laboratory facilities based on gender and experience simultaneously affects teaching basic science to students' learning achievement. Male and female teachers' utilization of science laboratory facilities has no significant effect on students' learning outcomes. The utilization of science laboratory facilities by experienced teachers has a significant effect on students' learning outcomes. Based on the research result, it implies a significant effect of teachers' experience on students' learning outcomes. It is because teachers' experience in teaching leads to teacher professionalism in utilizing all teaching facilities. At the same time, teacher gender does not influence students' learning outcomes. Both male and female teachers professionally utilizes the science laboratory facility to satisfy the students' learning outcomes.

This research suggests further research to cover the comprehensiveness of laboratory facilities, not only teacher gender and experience data. The more complex research variables, the more comprehensive the effect of the utilization of science laboratory on the students' learning outcomes.

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