Kontagora International Journal of Educational Research (KIJER) ISSN: 3027-0618
Volume 3, Issue 2, May 2026
https://fuekjournals.org/index.php/kijer

# Physics Teacher Demand and Supply in Relation to Students' Academic Achievement in Public Senior Secondary Schools in Southwest Nigeria (2017–2023)

**Nafisat Abolanle DUROJAIYE, Hammed Idowu ADEYANJU, Mushay A. OGUNDIPE, Semiu Adewale ADENIRAN & Peter Olumide OSHINYADI**

**Corresponding author: olupeter2807@yahoo.com**

*Department of Educational Management, College of Specialised and Professional Education, Tai Solarin Federal University of Education, Ijagun, Nigeria*

**DOI:** https://doi.org/10.5281/zenodo.20392111

**Abstract**

*This study analysed the trend relationship between demand and supply of physics teachers and students' academic achievement from 2017 to 2023 in public secondary schools in Southwest, Nigeria. The study adopted descriptive research design of retrospective-trend survey. The population comprised 6 Directors of Administration and Supplies of State Ministries of Education and 2,140 principals of Senior Secondary Schools in Southwest Nigeria. Multi-stage sampling procedure involving the use of simple random sampling, total enumeration, and convenience sampling techniques were used to select 30 respondents which comprised 3 Directors of Administration and Supplies and 27 Senior Secondary School principals from 27 schools in Ekiti, Ogun and Oyo States. Checklists were used for data collection. Descriptive data were analysed using mean, trend line charts, and lag effects between two time-series datasets were tested using Cross Correlation Function (CCF). Findings revealed that a significant time-based relationship exists between school demand for teachers from 2017-2023 and academic achievement of students in Physics. The most substantial and significant correlation appeared at Lag +1 which showed a negative relationship between current academic performance and the demand for Physics teachers in the subsequent academic year (Lag +1: $r = .608$, $p < .05$). The study recommends that government should prioritise recruitment, training, and retention of physics teachers in schools where the supply-demand gap is most severe.*

**Keywords:** Time-based relationship, physics demand-supply, academic achievement, secondary school teachers

## Introduction

Physics is crucial to societal development in terms of building modern technology and driving innovations in medicine, communication, energy, and transportation. The contributions of Physics to modern world cannot be ignored that every efforts must be geared towards achieving an optimum sustainable students' interest and academic achievement in the subject. It is the adoption of physics in the national life that makes the difference between the developed and the developing countries of the world (Yusuf, 2023). However, in Science, Technology, Engineering, and Mathematics (STEM), the shortage of physics teachers is one of the most severe (Dos-Santos, 2021). Physics is at the sharp end of teacher recruitment, often seen as a subject that schools find most difficult to staff. Manpower supply in the subject has been in short supply since the late 90s in many developed countries (Constable et al., 2001). An attempt to understand the shortage of teachers in physics subject at the secondary school level is necessary for the development of effective educational policies because the demand-supply problem is a global and persistent issue with negative consequences for the quality of science education (Erceg et al., 2023).

The perceived importance attached to this science discipline, and the high expectation placed on students' academic achievement in physics by all and sundry appeared to be deliberate and could be traced to the ambitious Sustainable Development Goals 3, 4 and 9 which linked quality science education delivery and outcome to quality education, good health and well-being, industry, innovation and infrastructures. Academic achievement is a measure of the output of learning in a particular subject. It is expressed in terms of change in knowledge, skills and attitudes of individuals as a result of their experience within the school system. At the senior secondary school level, it can be described as students' grades obtained in a subject at an end-of-term or certificate examination. Academic achievement in physics is influenced by strong math skills, effective teaching (using media/materials), teacher qualifications, student interest, peer influence, and teaching methods (Assem et al., 2023; Munir, 2020). According to Taangahar et al. (2022), physics yearly results in West African Senior School Certificate Examination (WASSCE) appear to be far from been satisfactory in spite of the vital role the subject plays in everyday life and national development. There is a low students' academic performance in physics which is as a result of the belief that physics is a difficult subject for students. Taangahar et al. (2022) found out that students' academic

achievement in physics at Senior Secondary Certification Examination since 2015 was high but the average performance rates did not exceed a credit pass limit.

The concept of demand can be defined as the rate at which consumers want to buy a product. In education economics, the demand for teachers are determined by the a number of factors including students' enrolment, retirement, resignation, leave, death, and transfer of teachers (Yusuf, 2023). Therefore, an increase in science student' enrolment in school will lead to demand for more physics teachers, and a factor like death will cause shortage of teachers which would then lead to demand for more physics teachers in secondary school. On the other hand, supply is the willingness and ability of a producer to supply goods at a given price. Higher education institutions such as polytechnics, colleges of education, and universities are the suppliers of physics teachers. They produce and supply teachers for secondary education in the society. The factors which determine the supply of teachers are salaries, good working condition, motivation, teachers' status in the society, and elevation of teaching profession. The law of economics which states that: the higher the price, the higher the supply, and the lower the price, the lower the supply; also holds that the higher the wages or salaries of physics teachers the more willing, they will be reading to offer their services. This implies that if the teaching profession becomes enterprises, more applications will apply to study to become secondary school physics teachers, thereby increasing the supply (Yusuf, 2023).

According to Ige cited in Awofala and Lawani (2020), teachers' demand bears little relationship with the economic indices of demand for goods and services. The major determinant of the demand for qualified teachers in public schools has always been linked to students' enrolment. Hence, it could be deduced that an increase in students' enrolment would naturally cause a rise in the demand for additional teachers. Awofala and Lawani (2020) also stated that the demand for teachers is an age-long issue, usually determined by the number of students available. Apart from students' enrolment, stakeholders are looking at other factors such as student-teacher ratio policy, enrolment dynamics, teacher demand/supply flow, teacher demand/supply gap and teacher recruitment/retention practices. It is worthy of note that the revised 2013 National Policy on Education put the student-teacher ratio policy in Nigeria at 40:1 (Federal Republic of Nigeria, 2013). However, students' enrolment continues to rise and more schools are being established by government, meaning that teachers demand will continue to attract the attention of education stakeholders. On the other hand,

the concept of teacher supply is used to refer to the composition of the actual teaching force and teacher supply shortages. Teachers' supply is the size of the teaching force, determined by the demand forces. The student-teacher ratio policy in Nigeria of 40:1 as contained in the 2013 revised NPE document also plays major role in defining teacher demand and supply. Edwards et al. (2023) defined teacher supply as the number of individuals completing approved programmes of teacher education and the number of active certificates for individuals who are not currently working in education. Also, Olojo et al. (2022) noted that teachers' supply may vary in terms of consideration due to geographical location, time and system of education in place. Whatever the case may be, the issue of teacher supply has continued to attract the attention of education stakeholders from time immemorial.

The broad objective of this study was to investigate the time-based relationship between demand and supply of physics teachers and students' academic achievement from 2017 to 2023 in public secondary schools in Southwest, Nigeria. The specific objectives were to:

1. investigate the trend of demand for physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria;
2. examine the trend of supply of physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria;
3. examine if there is a significant time-based relationship between school demand for physics teachers from 2017-2023 and academic achievement of students in physics in public secondary schools in Southwest, Nigeria; and
4. investigate whether there is a significant time-based relationship between supply of physics teachers from 2017-2023 and academic achievement of students in physics in public secondary schools in Southwest, Nigeria.

**Research Questions**

The following research questions were answered in this study:

1. What is the trend of demand for physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria?
2. What is the trend of supply of physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria?

**Hypotheses**

The following null hypotheses were tested in this study:

$H0_1$. There is no significant time-based relationship between school demand for physics teachers from 2017-2023 and academic achievement of students in physics in public secondary schools in Southwest, Nigeria.

$H0_2$. There is no significant time-based relationship between supply of physics teachers from 2017-2023 and academic performance of students in physics in public secondary schools in Southwest, Nigeria.

**Methodology**

The study adopted descriptive research design of retrospective-trend survey type. This was done by examining past records of physics teachers' demand and supply to identify patterns in students' academic achievement. Also, the study involved the selection of appreciable number of schools out of the large population of schools in Southwest Nigeria to examine changes or development in students' academic achievement at different points in time from 2017 to 2023. This study provides generalisation on the existing data obtained from the officials of State Ministries of Education and Principals of senior secondary schools on the demand and supply of physics teachers and students' academic achievement in Southwest, Nigeria without manipulation. The population of this study comprised all Directors of Administration and Supplies of State Ministries of Education and Principals of Public Senior Secondary Schools (SSS) in Southwest, Nigeria. There are six (6) Directors of Administration and Supplies in State Ministries of Education and 2,140 Public Senior Secondary School Principals in Southwest, Nigeria.

The sample size for this study was 30 respondents which comprised three (3) Directors of Administration and Supplies and 27 Senior Secondary School Principals in Southwest, Nigeria. Multistage sampling procedure was used to select the sample size for the study. At stage one, simple random sampling technique of balloting was used to select three states (Ekiti, Ogun and Oyo) out of the six states in Southwest, Nigeria. This was done to give each state equal chance of being selected. Thereafter, total enumeration was used to select all the three (3) Directors of Administration and Supplies of the Ministries of Education in charge of recruitment, induction, and confirmation of service of teaching personnel in the selected states, since there was one Director of Administration

and Supplies in each of the State Ministries of Education. At stage two which is at the local government level, simple random sampling technique was used to select 27 out of the 137 local government areas in the selected states. This represented 37% of the entire local government areas in the three states. At stage three which is at the school level, purposive sampling technique was employed to select 27 senior secondary schools (one in each of the 27 selected local government areas in Ekiti, Oyo and Ogun states, based on the oldest Senior Secondary Schools by year of establishment that met the criteria set for this study (availability of data on trends of teacher demand and supply as well as students' academic achievement from 2017 to 2023). Still at stage three, total enumeration was used to select 27 senior secondary school principals (one in each of the 27 selected local government areas of Ekiti, Oyo and Ogun states, since one senior secondary school is administered by one principal.

Three research instruments were used by the researchers for data collection. These include Trend of Physics Teachers' Demand Checklist (TPTDC), Trend of Physics Teachers' Supply Checklist (TPTSC), and Trend of Physics Students' Academic Achievement Proforma (TPAAP). The first instrument (TPTDC) is a researcher-structured instrument comprising items completed by the Director of Administration and Supplies of the Ministries of Education and school Principals, basically to indicate the trend of physics teachers demand at state and school levels respectively from 2017-2023 based on physics student-teacher ratio and yearly students school enrolment. The second instrument (TPTSC) is a researcher-designed instrument comprising items completed by the Director of Administration and Supplies of the Ministries of Education and school Principals, basically to indicate the trend of physics teachers' supply at state and school levels respectively from 2017-2023. The third instrument (TPAAP) is a researcher-designed instrument which comprises the state, name of school, school location and local government area. This was used by the researchers to source for information from school Principals on the achievements (grades) of physics students in WASSCE conducted by WAEC in Physics from 2017-2023.

The content validity of the instruments was established through expert validation by Professors of Measurement and Evaluation, and Educational Management. The experts scrutinised and edited the items in each instrument to ensure that they are in line with the purpose of the study. After which the items were re-framed as suggested. Letter was written to the officials of the State

Ministries of Education (SMoE) for permission to access the sampled Senior Secondary Schools to administer the instruments. Thereafter, six (6) research assistants were trained and employed in the administration of research instrument. The approval letter from the SMoE and the letter of introduction from the Department of Educational Management, Tai Solarin Federal University of Education (TASFUED), were presented to the principals of the selected schools accordingly. Informed consent were collected and incorporated into the instruments before proceeding administration. Respondents were assured of high level of confidentiality and anonymity of all information supplied and the data collected were used strictly for academic purpose only. The completion of the checklists was voluntary.

Descriptive statistics involving frequency counts, percentages, mean and trendlines charts were used to answer the research questions. Hypotheses 1 and 2 were analysed using inferential statistics to test for relationships. A lagged-variable was created for time series data of the independent variables, and Cross Correlation Function (CCF) was used to assess lagged effects or correlations between two data series. Lagged correlation was used to determine the relationship between the observations of two time series, $X_t$ and $Y_t$, separated by $k$ time units (the correlation between $Y_{t+k}$ and $X_t$) (Puetz & Borchardt, 2015). A correlation is significant when the absolute value of $r$ is greater than $2/\sqrt{n - |k|}$, or when p-value < .05.

**Results**

**Research Question One:** What is the trend of demand for physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria?

Table 1: Average Number of Students that Offered Physics, Average Number of Teachers Deployed to Teach Physics, and Average Number of Physics Teachers Demanded by Public Secondary Schools from 2017-2023

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | Average (per school per year |
|---|---|---|---|---|---|---|---|---|
| A | 3684 | 3890 | 3702 | 3358 | 4099 | 3512 | 4317 | 140 |
| B | 27 | 28 | 27 | 28 | 27 | 26 | 26 | 1.00 |
| C | 3.41 | 3.60 | 3.43 | 3.11 | 3.80 | 3.25 | 4.00 | 3.51 |

*Source*: Computed by the Researchers from individual school data using the required baseline standard of teacher-to-student ratio of 1:40. Note. n (Number of schools surveyed) = 27; *i* (the number of academic years considered) = 7. A = Total number of students that

offered the subject; B = Total number of physics teachers deployed to schools; C = Physics teachers demanded by public secondary schools.

The data in Table 1 showed that Physics teacher demand showed minor fluctuations throughout the years. It began at an average of 3.41 in 2017, and experienced slight growth to 3.60 in 2018, then declined to 3.11 by 2020. However, from 2021 onward, there was a steady increase, reaching 4.00 in 2023. Despite the relatively modest figures, the upward trajectory in the later years suggested a gradual strengthening of interest or need for Physics instruction.

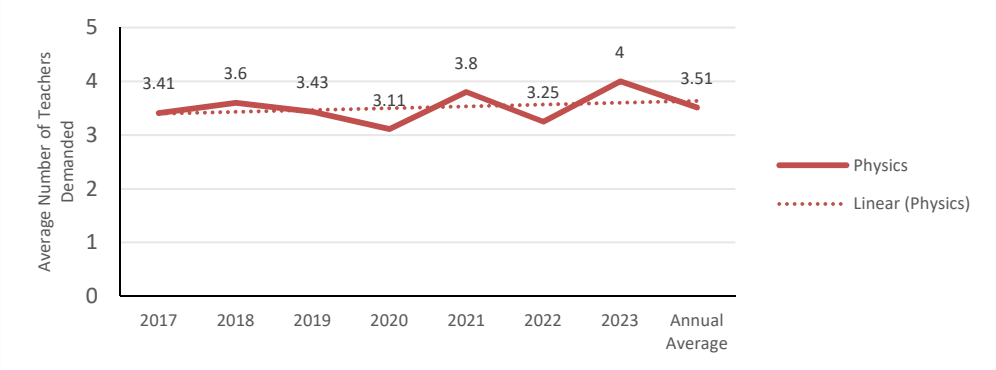


**Figure 1:** Line graph visualizing the linear trends of demand for Physics teachers in public secondary schools in Southwest Nigeria from 2017 to 2023

**Research Question Two:** What is the trend of supply of physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria?

Table 2: Average Number of Physics Teachers Supplied to Public Secondary Schools from 2017 to 2023

| | Year ($i$ = 7) | | | | | | | Annual average |
|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | |
| B | 27 | 28 | 27 | 28 | 27 | 26 | 26 | 1.00 |
| C | 1.00 | 1.04 | 1.00 | 1.04 | 1.00 | 0.96 | 0.96 | 1.00 |

*Source*: Computed by the Researchers from individual school data on number of teachers employed to teach the subject using the Trend of Physics Teachers' Supply Checklist (TCTSC) instrument. Note. B = Total number of teachers deployed to schools; C = Physics Teachers Demanded by Public Secondary Schools.

The results presented in Table 2 showed that the annual average number of physics teachers supplied to public secondary schools from 2017 to 2023 in Southwest, Nigeria was 1.00. The data

revealed that physics teacher supply remained relatively stable, hovering around 1 teacher throughout the period, with a minor dip to 0.96 in 2022 and 2023, and an annual average of 1.00 physics teacher was recorded for each school. Figure 2 illustrated that the supply of physics teachers remained relatively stable over the period of 2017 to 2023.

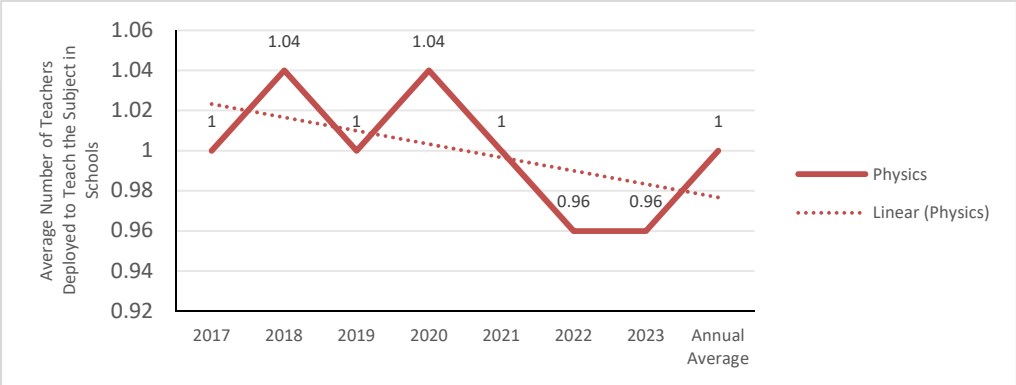


**Figure 2:** Line graph visualizing the linear trend of supply of Physics teachers to public secondary schools in Southwest Nigeria from 2017 to 2023

**Hypothesis One:** There is no significant time-based relationship between school demand for physics teachers from 2017-2023 and academic achievement of students in physics in public secondary schools in Southwest, Nigeria.

Table 3: Time-Lagged Correlation Results for the Relationship between School Demand for Teachers (2017-2023) and Academic Achievement in Physics

| Lags ($Y_{t\pm k}$) | r | $r^2$ | Sig. |
|---|---|---|---|
| Lag -1 (Previous year's school demand) | -.124 | .015 | .816 |
| Lag 0 (No time lag) | -.113 | .013 | .810 |
| Lag +1 (Next year's school demand) | -.608* | .370 | .020 |

Note. *Correlation is significant at .05 level, **Correlation is significant at .01 level, $r^2$ is the coefficient of determination.

Table 3 presented that at Lag -1, the correlation coefficient, r was -.124 with a coefficient of determination ($r^2$) of 0.015 and a p-value of .816. This reflected a very weak and statistically insignificant negative relationship between the previous year's demand for Physics teachers and students' academic performance. The low $r^2$ value indicates that only about 1.5% of the variation in

academic performance can be explained by the prior year's demand for Physics teachers. At Lag 0, the correlation remained weak and negative (r = -.113), with $r^2$ = 0.013 and a p-value of .810. This suggested that current demand for Physics teachers also does not meaningfully relate to academic performance in the same year, with only 1.3% of academic performance variance explained. However, at Lag +1, the correlation becomes significantly negative (r = -.608), with a coefficient of determination ($r^2$) of 0.370 and a p-value of .020. This statistically significant result implied a moderately strong negative relationship between current academic performance and the demand for Physics teachers in the subsequent year. Thus, the null hypothesis one was rejected.

**Hypothesis Two:** There is no significant time-based relationship between supply of physics teachers from 2017-2023 and academic performance of students in physics in public secondary schools in Southwest, Nigeria.

Table 4: Time-Lagged Correlation Results for the Relationship between Supply of Teachers from 2017-2023 and Academic Performance in Physics

| Lags ($Y_{t\pm k}$) | r | $r^2$ | Sig. |
|---|---|---|---|
| Lag -1 (Previous year's teacher supply) | .346 | .120 | .502 |
| Lag 0 (No time lag) | .646 | .417 | .117 |
| Lag +1 (Next year's teacher supply) | .891* | .794 | .017 |

Note. *Correlation is significant at .05 level, **Correlation is significant at .01 level, $r^2$ is the coefficient of determination.

The lagged correlation results in Table 4 showed that at lag -1, which represented the previous year's teacher supply, the correlation coefficient, r was .35. This indicated a weak positive relationship, suggesting that an increase in the supply of Physics teachers in the previous year slightly influences the academic performance of students in the following year, but the effect is not statistically significant (p = .502). At lag 0, representing the correlation between the current year's teacher supply and students' performance, the correlation coefficient was .65. This showed a moderate positive relationship, meaning that when there is an adequate supply of Physics teachers in a particular year, students tend to perform better in that same year. However, this correlation is not statistically significant (p = .117), indicating that while the relationship exists, it might have occurred

by chance. However, at lag +1, which showed the correlation between the supply of Physics teachers and students' academic performance in the following year, the correlation coefficient was .89. This indicates a very strong positive relationship and was statistically significant at the .05 level ($p = .017$). Thus, the null hypothesis two was rejected.

**Discussion**

Research question one analysed the trend of demand for physics teachers in public secondary schools from 2017 to 2023 in Southwest Nigeria. The results showed a consistent increase in the demand for physics teachers. The trends observed in the demand reflects broader national challenges within the Nigerian education system. The increasing demand for Physics teachers aligns with documented shortages of qualified educators across the country. According to the Universal Basic Education Commission (UBEC), Nigeria experienced a 29% reduction in teachers during the COVID-19 pandemic, exacerbating existing deficits (UBEC, 2023). This decline has intensified the need for science teachers, particularly in specialised subjects. The shortage of qualified science teachers has significant implications for educational quality. This supported Ogunmade's (2013) findings that factors such as insufficient teaching resources, inadequate teacher training, and poor working conditions hinder effective science instruction. These challenges contributed to diminished student performance and interest in science subjects, further emphasizing the necessity for competent educators in these disciplines. Efforts to address these shortages have been inconsistent across Nigerian states. For instance, in 2023, only 12 out of 36 states recruited new teachers, with a total of 23,092 hires (National Union of Teachers, 2024). However, this number falls short of the estimated 300,000 additional teachers needed to tackle the out-of-school children crisis and improve educational outcomes (Teachers Registration Council of Nigeria, 2023). The uneven recruitment efforts highlighted the necessity for a coordinated national strategy to address teacher shortages.

Research question two analysed the trend of supply of physics teachers in public secondary schools from 2017 to 2023 in Southwest states. Findings revealed that the overall trends in supply remained largely consistent over the observed period (2017-2023). This finding aligned with broader concerns about teacher shortages and attrition in science education observed by Darling-Hammond (2003) and Ingersoll (2001). The stability in the supply of Physics teachers, albeit at a low level, suggests unique factors influencing this specific subject area. However, the overall trend of decline

across other science disciplines raises concerns about the potential impact on the quality of science education. Teacher shortages in science subjects can lead to overburdened educators, larger class sizes, and the assignment of teachers to subjects outside their area of expertise, all of which can negatively affect student learning outcomes (Rice, 2003). The implications of these findings for Southwest, Nigeria are significant. A shortage of qualified teachers can hinder the development of a scientifically literate population, which is crucial for economic growth and technological advancement.

Hypothesis one tested the time-based relationship between school demand for teachers from 2017-2023 and academic achievement of students in Physics in public secondary schools in Southwest, Nigeria. Findings revealed a significant negative correlation at Lag +1 between students' academic achievement in Physics and school demand for Physics teachers in the following academic year which suggested that teacher demand may be responsive to prior student outcomes, rather than a predictor of them. This reactive pattern aligned with some findings in the literature while standing in contrast to others. Several studies corroborated the idea that educational systems often respond to poor student achievement by increasing teacher recruitment or reallocation, rather than such staffing decisions proactively influencing outcomes. For instance, Bowers and White (2014) found out that school districts frequently adjust staffing decisions, including hiring more teachers, in reaction to declining student performance trends. Similarly, Ingersoll and Perda (2010) noted that increased teacher demand often follows systemic reviews of student achievement, suggesting a reactive, rather than proactive, staffing pattern.

Hypothesis two tested the time-based relationship between supply of teachers from 2017-2023 and academic achievement of students in Physics in public secondary schools in Southwest, Nigeria. Findings revealed a significant positive correlation between the supply of Physics teachers and students' academic achievement in subsequent years. This finding agreed with the finding of Owolabi and Adedayo (2012) who investigated the impact of teacher qualifications on the performance of senior secondary school physics students in Nigeria. Their study revealed that students taught by teachers with higher qualifications performed better than those taught by less qualified teachers, highlighting the importance of supply of qualified teacher in student outcomes. Similarly, Shedrack and Nduudee (2023) examined the relationship between teachers' qualifications and secondary school

Physics students' academic performance in Rivers State. Their findings indicated that teacher qualifications significantly influence students' academic performance, reinforcing the notion that well-qualified teachers contribute positively to student achievement.

## Conclusion

The conclusion drawn from this study's findings is that the trend of demand for physics teachers showed a consistent increase while the trend of supply of physics teachers revealed a relatively stable supply. The trend in academic achievement of students in Physics based on supply of teachers to public secondary schools in Southwest, Nigeria from 2017-2023 showed a slight decline in the supply of Physics teachers from 2017 to 2023 which corresponded with a gradual drop in students' academic achievement in Physics. There was a significant time-based relationship between school demand for teachers from 2017-2023 and academic achievement of students in Physics. The most substantial and significant correlation appeared at Lag +1 which showed a negative relationship between current academic performance and the demand for Physics teachers in the subsequent academic year. There was also a significant time-based relationship between supply of teachers from 2017-2023 and academic achievement of students in Physics. The most substantial and significant correlation appeared at Lag +1 which showed a strong correlation between the supply of physics teachers and students' academic achievement rates in the following year.

## Recommendations

The researchers recommend the following based on the study's findings:

1) Since there was a gradual steady increase in demand for physics teachers, government should prioritise targeted recruitment, training, and retention of physics teachers, where the supply-demand gap is most severe. Special incentives such as scholarships, housing, rural allowances, and career development opportunities should be provided by government to attract qualified graduates into science education. This would help bridge the critical shortage and improve the student-teacher ratio in public secondary schools across the Southwest zone of Nigeria.
2) School administrators should ensure equitable distribution of the available science teachers and make use of strategic timetabling to optimise the few subject specialist teachers available in the school. Additionally, school administrators should collaborate with teacher training institutions for teaching

practice placements and part-time teaching arrangement to temporarily cushion the effect of teacher shortages while long-term solutions are pursued.

3) Policy makers in the Ministry of Education should initiate teacher subject specialism training programme (that is, training to teachers who are not specialists in physics, as well as teachers returning to the teaching profession) to assist in the number of teachers supplied to public schools.

**References**

Adedeji, T. O., Usman, A. M., & Bello, H. A. (2022). Teacher demand and supply and students' academic performance in secondary schools in North-West Nigeria. *Frontiers: Journal of Social Sciences and Humanities, 2*(2), 19–28. https://www.sciencepg.com/article/10.11648/j.frontiers.20220202.13?utm_source=chatgpt.com

Assem, H. D., Nartey, L., Appiah, E., & Aidoo, J. K. (2023). A review of students' academic performance in physics: Attitude, instructional methods, misconceptions and teachers qualification. *European Journal of Education and Pedagogy, 4*(1), 10.24018/ejedu.2023.4.1.551

Awofala, A. O., & Lawani, R. F. (2020). Examining the efficacy of co-operative learning strategy on undergraduate students' achievement in mathematics. *International Journal of Pedagogy and Teacher Education, 4*(1), 59-82.

Bowers, A. J., & White, B. R. (2014). Do principal preparation and teacher qualifications influence student achievement across schools? A regression discontinuity approach. *Educational Administration Quarterly, 50*(4), 555–587. https://doi.org/10.1177/0013161X13509950

Constable, H., Bolden, D., & Spindler, J. (2001). *Supply, recruitment and retention of physics teachers*. Faculty of Health, Social Work and Education, University of Northumbria, Newcastle.

Darling-Hammond, L. (2003). Keeping good teachers: Why it matters, what leaders can do. *Educational Leadership, 60*(8), 6-13.

Dos-Santos, L. M. (2021). From industry professionals to secondary school teachers: The relationship between second career-changing teachers and social cognitive career theory. *Academic Journal Interdisciplinary Studies, 10*, 150.

Edwards, D. S., Kraft, M. A. Christian, A., & Candelaria, C. A. (2023). *Teacher shortages: A unifying framework for understanding and predicting vacancies*. EdWorking Paper 22-684. Available online at https://doi.org/10.26300/8t5b-2302

Erceg, N., Jelovica, L., Mesic, V., Nesic, L., Beljan, I. P., & Nikolaus, P. (2023). Causes of the shortage of physics teachers in Croatia. *Education Sciences, 13*(8), 788. https://doi.org/10.3390/edusci13080788

Federal Republic of Nigeria (2013). *National policy on education (6th ed.)*. Nigerian Educational Research and Development Council. https://nipc.gov.ng/wp-content/uploads/2020/11/National-Education-Policy-2013.pdf

Hazzan, M. K. (2024). Influence of teacher availability on student academic achievement in public secondary schools in Southwestern Nigeria. *American Journal of Education and Learning, 9*(2), 191–204. https://doi.org/10.55284/ajel.v9i2.1185

Ingersoll, R. M. (2001). Teacher Turnover and Teacher Shortages: An organizational analysis. *American Educational Research Journal, 38*(3), 499-534.

Ingersoll, R. M., & Perda, D. (2010). Is the supply of mathematics and science teachers sufficient? *American Educational Research Journal, 47*(3), 563–594. https://doi.org/10.3102/0002831210370711

Munir, A. (2020). Effect of video-based multimedia instructional approach on students' academic performance in physics among senior secondary schools in Katsina metropolis, Nigeria. *UMYU Journal of Science Management and Vocational Educational, 1*(2), 93-97.

National Union of Teachers (2024). *Recruitment: NUT lists states that employed 23,092 teachers in 2023*. Naija News. Retrieved from https://www.naijanews.com/2024/07/09/recruitment-nut-lists-states-that-employed-23092-teachers-in-2023/

Ogunmade, T. O. (2013). Nigerian science teachers' perceptions of effective science teaching and their classroom teaching practices in junior secondary schools in Lagos State, Nigeria. *Journal of Education and Practice, 4*(25), 78-85.

Olojo, O. J., Omolara, A. I., & Olofin, S. O. (2022). Comparative analysis of secondary school students' performance in science subjects in Ekiti state, Nigeria. *British Journal of Education, 10*(3), 73-84. https://www.eajournals.org/

Owolabi, O. T., & Adedayo, J. O. (2012). Effect of teacher's qualification on the performance of senior secondary school physics students: Implication on technology in Nigeria. *English Language Teaching, 5*(6), 72-77. Retrieved from https://ccsenet.org/journal/index.php/elt/article/view/17467

Puetz, S., & Borchardt, G. (2015). Quasi-periodic fractal patterns in geomagnetic reversals, geological activity, and astronomical events. *Chaos, Solitons and Fractals, 81*, 246-270. https://www.dx.doi.org/10.1016/j.chaos.2015.09.029

Rice, J. K. (2003). *Teacher quality: Understanding the effectiveness debate*. Economic Policy Institute.

Shedrack, T., & Nduudee, N. J. (2023). Teachers' qualification and secondary school physics students' academic performance in Emohua Local Government Area, Rivers State. *Faculty of Natural and Applied Sciences Journal of Mathematics, and Science Education, 5*(1), 124–132. Retrieved from https://fnasjournals.com/index.php/FNAS-JMSE/article/view/249

Taangahar, B., Fatoki, J. O., & Joshua, J. D. (2022). Students' academic performance in physics as a correlate of their academic performance in Mathematics in Makurdi Local Government Area, Benue State. *International Journal of Multidisciplinary Research and Growth Evaluation, 2*(6), 16-19.

Teachers Registration Council of Nigeria (2023). Nigeria needs over 300,000 new teachers to address out-of-school children crisis. *Tribune Online*. Retrieved from https://tribuneonlineng.com/nigeria-needs-over-300000-new-teachers-to-address-out-of-school-children-crisis-trcn/

Universal Basic Education Commission (2023). *UBEC bemoans shortage of teachers, N100b yearly funding*. The Guardian Nigeria News. Retrieved from https://guardian.ng/news/ubec-bemoans-shortage-of-teachers-n100b-yearly-funding/

Yusuf, M. A. (2023). Demand and supply: A determinant for availability of secondary school science teachers in Oyo State, Nigeria. *International Journal of Arts and Social Science, 6*(11), 204-213. Available online at https://www.ijassjournal.com/2023/v6l11/4146663693.pdf