



Influence of Laboratory Technicians Characteristics on Support to Science Teaching in Secondary Schools in Uyo Senatorial District of Akwa Ibom State, Nigeria

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ABSTRACT: The influence of academic qualification, age, gender and years of experience of laboratory technicians on the support they provide to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria, was investigated using questionnaire to collect data from eighty (80) science laboratory technicians out of the 125 posted to public secondary schools within the study area. With a calculated F ratio of 6.297 at 2 and 77 degrees of freedom being greater than the table value of 3.07, educational qualification of technicians significantly influenced their support to teaching of science subjects. A calculated F ratio of 2.061 at 3 and 76 degrees of freedom being less than the table value of 2.68 at 0.05 degrees of freedom, age of laboratory technicians was found not to significantly influence support to science teaching. An F ratio of 3.393 obtained at 2 and 77 degrees of freedom and 0.05 level of significance, made the years of working experience of the technicians to significantly influence their support to science teaching. With a calculated t-value of 0.089 being less than the table value of 1.660 at 78 degrees of freedom, gender of laboratory technicians was found not to significantly influence their support to science teaching. Young and newly employed science laboratory technicians should be encouraged to obtain higher qualification and motivated to stay to increase their efficiency.

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Learning outcomes in science subjects can be enhanced by adopting the inquiry method. As Ula and Mariyani (2021) put it, inquiry-based learning or inquiry-based science describes a variety of philosophical, curricular and pedagogical approaches to teaching. This is because, pedagogy and curriculum require learners to work independently to solve problems rather than receive direct instruction on what to do from the teacher. In Inquiry learning, teachers are expected to be facilitators of learning and not act as a store of knowledge that needs to be offloaded into the learner. Therefore, the role of the lecturer or teacher in

the inquiry learning environment is not to provide knowledge, but to help learners along the process of finding their own knowledge (Aceska 2016). According to Hackling (2009), secondary science education needs to be more inquiry oriented and involve authentic and practical investigations to develop scientific literacy and better engage students in learning science. Inquiry-oriented approaches require both human and material resources to support learning. For the teachers to perform their role creditably well, they need to have access to good laboratories with adequate facilities and equipment

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which must be supported by knowledgeable laboratory technicians. Laboratory technologists/technicians are supporting staff to science teachers in pursuit of proper implementation of the Science Curriculum. Their roles include offering support to the teaching staff and working closely with the Head of Science and the Science staff to ensure that Science

Curriculum is delivered efficiently and safely at all times throughout the session. Zengele and Alemayehu (2016) found that (i) The current status of laboratory works in secondary schools have been in a very low level where science teaching learning process is not supported adequately by laboratory works; (ii) The most determinant constraints of laboratory activities in secondary schools include lack of laboratory rooms, inadequate supply of laboratory equipment, reagents and facilities, absence of trained laboratory technicians/teachers, lack of commitment and interest of teachers, lack of regular schedule for laboratory activities, poor management, monitoring and evaluations of laboratory activities, no system for grading and assessment of laboratory examinations (iii) laboratory activities did not get the necessary concern in all schools. Good science instruction is known to involve interplay of experiments, observation and theoretical inferences. For experiments to be conducted there should be a laboratory with basic equipment and consumables and technicians to support the process of science practical. Anything short of this will lead eventually to a compromise in the implementation process which will give rise to poorly prepared products of the school system. Several researches have been mounted to investigate the possible reasons for the poor performance of students in science courses at the Secondary School level. Most of these researches target the teachers and facilities available for use by the teachers in their role of transferring knowledge and skills. Findings from Ogunmade (2005) indicate a gap between actual science teaching and learning and an ideal school science with regards to curriculum, pedagogy and learning, class sizes and resource allocation, teacher knowledge and skills, attitude and professional development, and community support. Omorogbe and Ewansiha (2013) identified factors that affect students' performance in science in Nigerian schools to include Quality Science teaching which is predetermined by five Science Teacher quality indicators which are academic and professional qualification, In-service refresher courses and trainings, teacher experience, teacher salary and quality teaching-learning resources. However, quality teaching guarantees learning. Adegbamigbe cited in Ogunmade (2005) defines quality teaching as a series of dynamic processes and activities of teachers' actions within the educational context with a view to

enhancing quality of students' learning. Vant Hooff (2005) claims that quality teaching encompasses prior knowledge activation, hands-on learning, and continuous reflection. In the science-by-inquiry classroom, the job of ensuring quality teaching cannot be only for the teacher because according to Ogunmade (2005), in actual 80-minute science lessons, teachers devote more than two-thirds of lesson time to teacher-centered activity and less than one-third to student-centered activity. Ogunmade (2005), in a study on status of science teaching in Lagos state observed that the majority of teachers believe that ideal/effective science teaching involves hands-on group activity and regular interaction between learners and the teacher made possible by manageable class sizes and adequate facilities and resources. The integration of practical activities into science teaching has been found to be of immense benefit to the learners.

The influence of age on performance of technicians, according to Lewis and Gospel (2015) was mentioned by the representatives of some engineering departments, who lamented the fact that older technicians in particular do not have enough mechatronic skills (that is, with the ability to integrate mechanical and electronic components so as to be able to measure and control the performance of the systems in which they are embedded). But the problem appears to be most acute in the case of the biological sciences, where some interviewees argued that the rapid pace of change in the techniques used in biological research over the past 20 years has left a number of technicians with skills that are peripheral to their departments' needs. This shows that older technicians may be out of phase with new technologies brought into the laboratories. In terms of experience, Hackling (2011) discovered that the mean number of years of experience in school science laboratories was 10.8 years. However, the findings of Hackling in terms of technicians' support to science teaching showed that; *"at the top end technicians were seen to be dedicated, enthusiastic and supportive of teaching staff, suggest ideas to improve practical work and have the best knowledge of safety in the department. At the other end concern was expressed for technicians who are unqualified, poorly trained, inexperienced, have language difficulties or are unwilling to change"*. In terms of percentages, Hackling (2011) found that Seventy per cent (70%) of the study sample schools indicated that the amount of technical support was good, however, 10% indicated it was poor. Thirty-six per cent of schools did not have sufficient technical support during school holidays for maintenance, stock-taking and occupational health and safety compliance activities. Hackling (2011) also reported

shortage of relief technicians who can be employed when technicians are on sick leave. It was observed that many schools indicated that if they had more technical support, the amount (46% of schools) and quality (59%) of practical work in the curriculum would be improved. In terms of qualification, Hackling (2011), noted that Thirty-eight per cent of the technicians in the study had an Australian VET Qualification relating to laboratory work, 31% had Science Degrees and 50% had First Aid Qualifications. However, 9% had no postsecondary education relevant to laboratory work. However, the report of Shelter Right Initiative as expressed in Obomanu and Adaramola (2011) clearly stated that Nigeria trailed behind other West African countries for nine consecutive years in STM academic performance. According to Uzoechi cited in Obomanu and Adaramola (2011), students do not only perform poorly at the cognitive level, they also perform below average at the affective and psychomotor domains respectively. This has significant impact on the quality and quantity of candidates seeking admission into science and technology related courses in tertiary institutions across the country. Teaching of science has been blamed for this poor performance. The process of teaching science by inquiry which is the widely accepted method for development of science process skills by students requires that the science teacher has relevant laboratory space, apparatus and equipment; and the necessary technical support to carry out the service effectively. Laboratory technicians are employed to perform such roles of supporting the work of science teaching Therefore, the objective of this paper is to investigate the influence of academic qualification, age, gender and years of experience of laboratory technicians on the support they provide to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria

MATERIALS AND METHODS

Area of the Study: This study was undertaken in Uyo senatorial district of Akwa Ibom state. The area of the study consists of nine local government areas which the state capital form a part. The local government areas are Uyo, Itu, Ibesikpo-Asutan, Ibiono, Etinan, Nsit Atai, Nsit Ibom, Nsit Ubium and Uruan. The area has 81 public secondary schools which most are heavily populated with students, teachers and science laboratory technologists/technicians alike.

Population of the Study: This study targeted all the laboratory technicians in all the public secondary schools in Uyo Senatorial district of Akwa Ibom State. A total of 125 Laboratory Technician are working in secondary schools in the study area according to data

obtained from Akwa Ibom State Secondary Education Board.

Sample/and Sampling Technique: The simple random sampling technique was used to select 60 schools, in the study area for the study. A total of 80 Science Laboratory technologists/technicians in the selected schools formed the sample of the study.

Instrument of the study: A researcher structured questionnaire titled "Laboratory Technicians Characteristics and Support to Science Teaching Questionnaire" was developed for the study. It had two sections. Section A consisted of the demographic characteristics of the respondents while section B consisted of 30 items structured in a four point Likert type scale of Always, Often, Rarely and Never on the support to science teaching.

Data Collection: The questionnaire was administered directly on the respondents by the researchers or their assistants trained specifically for this purpose. Eighty (80) copies of the questionnaire were correctly filled and returned and were used for the analysis.

Data Analysis: Data generated from the study were analyzed using descriptive and inferential statistics. The Analysis of Variance and Independent t-tests statistical techniques were adopted to compare the mean scores of the support to science teaching by the respondents based on their characteristics.

RESULTS AND DISCUSSION

Study variables like educational qualification, age, years of experience and gender were analyzed as factors influencing the support given by the laboratory technicians to science teaching in secondary schools.

Research Question 1: To what extent does the level of education of laboratory technicians influence the level of support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom state? The result in Table 1 shows the mean, standard deviation, standard error and the 95% confidence interval of the mean scores of the respondents in accordance with their level of education. Technicians with National Diploma ND had a mean score (56.3235) with a standard deviation (9.7034), those with HND had mean (64.128) with standard deviation (9.857) while those with Post HND had mean score (57.4286) with standard deviation (7.435). The overall mean score of the respondents was 60.225 out of 120 with a standard deviation 10.2488.

Hypothesis One: Level of education of laboratory technicians does not significantly influence level of support provided by laboratory technicians to science

teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria.

Table 1: Descriptive analysis between level of education and support to science teaching by science laboratory technicians

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|----------|----|---------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| ND | 34 | 56.3235 | 9.70386 | 1.66420 | 52.9377 | 59.7094 | 44.00 | 81.00 |
| HND | 39 | 64.1282 | 9.85735 | 1.57844 | 60.9328 | 67.3236 | 47.00 | 85.00 |
| POST HND | 7 | 57.4286 | 7.43544 | 2.81033 | 50.5519 | 64.3052 | 46.00 | 69.00 |
| Total | 80 | 60.2250 | 10.24877 | 1.14585 | 57.9442 | 62.5058 | 44.00 | 85.00 |

Source: Researchers; SPSS analysis (2021)

Table 2: ANOVA of support to science teaching based on educational qualification.

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 1166.436 | 2 | 583.218 | 6.297 | .003 |
| Within Groups | 7131.514 | 77 | 92.617 | | |
| Total | 8297.950 | 79 | | | |

Source: Researchers; SPSS analysis (2021)

Table 3: Descriptive analysis between age and support to science teaching by science laboratory technicians

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|------------------|----|--------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 21 - 30 YRS | 27 | 61.148 | 9.30965 | 1.79164 | 57.4654 | 64.8309 | 45.00 | 85.00 |
| 31 - 40 YRS | 32 | 60.125 | 10.29485 | 1.81989 | 56.4133 | 63.8367 | 45.00 | 81.00 |
| 41 - 50 YRS | 18 | 61.333 | 11.18297 | 2.63585 | 55.7722 | 66.8945 | 45.00 | 83.00 |
| 51 YRS AND ABOVE | 3 | 46.333 | 2.08167 | 1.20185 | 41.1622 | 51.5045 | 44.00 | 48.00 |
| Total | 80 | 60.225 | 10.24877 | 1.14585 | 57.9442 | 62.5058 | 44.00 | 85.00 |

Source: Researchers; SPSS analysis (2021)

Results in Table 2 shows that the support to science teaching by laboratory technicians differs significantly based on educational qualification. Based on the ANOVA, with $f = 6.297, p = 0.073$, the null hypothesis one is therefore rejected for the alternative. Educational qualification of science laboratory technicians significantly influences the support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom state, Nigeria. This is in favour of technicians with HND which had the highest means score.

Research Question 2: To what extent does the age of laboratory technicians influence the level of support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom state?

Results in Table 3 show the mean, standard deviation, standard error and the 95% confidence interval of the

mean scores of the respondents in accordance with their ages. Technicians within the age bracket 21 – 30 years had a mean support score of 61.1481 with standard deviation (9.3096). Those within the age bracket 31 – 40 years had mean score (60.125) with a standard deviation (10.2948), those within the age range 41 – 50 years had mean (61.333) with standard deviation (11.183) while those above 50 years of age had mean score (46.333) with standard deviation (2.082).

Hypothesis Two: Age of laboratory technicians does not significantly influence level of support provided by the technician to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria.

Table 4: ANOVA analysis of support to science teaching based on age of science laboratory technicians.

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 624.376 | 3 | 208.125 | 2.061 | .112 |
| Within Groups | 7673.574 | 76 | 100.968 | | |
| Total | 8297.950 | 79 | | | |

Source: Researchers; SPSS analysis (2021)

The influence of age on support to science teaching by science laboratory technicians is tested for different age ranges of the technicians. Results in Table 4 shows that support to science teaching by laboratory technicians does not differ significantly based on their

ages. From the ANOVA, with $f = 2.061, p = 0.112$, the null hypothesis two is hereby upheld that the age of science laboratory technicians does not significantly influence the support to science teaching in secondary

schools in Uyo Senatorial district of Akwa Ibom state, Nigeria.

technicians influence their support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom state?

Research Question 3: To what extent does the number of years of working experience of laboratory

Table 5: Descriptive analysis of years of working experience and support to science teaching by science laboratory technicians

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|------------------|----|---------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| | | | | | 1 - 10 YRS | 34 | | |
| 11 - 20 YRS | 28 | 59.1429 | 10.24773 | 1.93664 | 55.1692 | 63.1165 | 46.00 | 83.00 |
| 21 YRS AND ABOVE | 18 | 56.0556 | 10.55224 | 2.48719 | 50.8081 | 61.3031 | 44.00 | 80.00 |
| Total | 80 | 60.2250 | 10.24877 | 1.14585 | 57.9442 | 62.5058 | 44.00 | 85.00 |

Source: Researchers; SPSS analysis (2021)

The results in Table 5 shows the mean, standard deviation, standard error and the 95% confidence interval of the mean scores of the respondents in accordance with their years of working experience as science laboratory technicians. Technicians that have served between 1 – 10 years who were recently employed had a mean support score of 63.3235 with standard deviation (9.370). Those within the service period of 11 – 20 years had mean score 59.1429 with a standard deviation (10.2477), those within the years of service 21 years and above had a mean 56.0556 with standard deviation (10.552).

had a mean score 60.077 with a standard deviation (9.453).

Hypothesis Three: Years of experience of laboratory technicians does not significantly influence the level of support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria. As shown in Table 6, the $f = 3.393$ is significant 0.039 which renders null hypothesis three rejected for the alternative that years of working experience significantly influence the support to science teaching given by science laboratory technicians. The technicians who were within the first 10 years of employment tended to show more enthusiasm to support science teaching, which led to their having the highest mean score.

Hypothesis Four: There is no significant difference in the level of support given to science teaching between male and female laboratory technicians in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria.

Research Question 4: To what extent does the gender of laboratory technicians influence the level of support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom state? From results in Table 7, the 54 male Science Laboratory Technicians had a mean score 60.296 and standard deviation (10.6958) and their 26 female counterparts

From the results shown in Table 8, the computed t value is 0.089 at 78 degrees of freedom is less than the table value of 1.667 at 0.05 level of significance. Thus null hypothesis four is hereby upheld. Gender of the science laboratory technician does not significantly influence the support to science teaching in secondary schools in Uyo Senatorial district of Akwa Ibom State, Nigeria. This indicates that male and female laboratory technicians provide relatively similar support to science teaching in their respective schools. Results show that educational qualification of science laboratory technicians significantly influences support to science teaching. Technicians with HND exhibited significantly higher level of support than those with ND. It is further indicated that age of science laboratory technicians does not significantly influence support to science teaching in secondary schools in Uyo Senatorial district. This is at variance with the findings of Lewis and Gospel (2011) that the rapid pace of change in the techniques used in science research over the past 20 years has left a number of older technicians with skills that are peripheral to their departments’ needs. This shows that older technicians have been out of phase with new technologies brought into the laboratories which indicated significant influence of age on support to science teaching.

Table 6: ANOVA of support to science teaching based on years of experience of science laboratory technicians.

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 672.136 | 2 | 336.068 | 3.393 | .039 |
| Within Groups | 7625.814 | 77 | 99.037 | | |
| Total | 8297.950 | 79 | | | |

Source: Researchers; SPSS analysis (2021)

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Table 7: Descriptive analysis of gender and support to science teaching by science laboratory technicians.

| Group Statistics | | | | | |
|------------------|--------|----|---------|----------------|-----------------|
| | GENDER | N | Mean | Std. Deviation | Std. Error Mean |
| SUPPORT_SCORE | MALE | 54 | 60.2963 | 10.69585 | 1.45552 |
| | FEMALE | 26 | 60.0769 | 9.45272 | 1.85383 |

Source: Researchers; SPSS analysis (2021)

Table 8: T – test analysis of influence of gender on support to science teaching by science laboratory technicians.

| | | t-test for Equality of Means | | | | | | | | |
|---------------|-----------------------------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|--|--|
| | | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | | | |
| | | | | | | Lower | Upper | | | |
| SUPPORT_SCORE | Equal variances assumed | .089 | 78 | .929 | .21937 | 2.46194 | -4.68197 | 5.12072 | | |
| | Equal variances not assumed | .093 | 55.393 | .926 | .21937 | 2.35695 | -4.50331 | 4.94206 | | |

Source: Researchers; SPSS analysis (2021)

Results in the present study also show that years of service has significant influence on support to science teaching given by laboratory technicians. This supports Hackling (2000) that at the top end technicians were seen to be dedicated, enthusiastic and supportive of teaching staff, suggest ideas to improve practical work and have the best knowledge of safety in the department. At the other end concern was expressed for technicians who are inexperienced. This indicates that qualification and years of service are indices known to significantly influence output of science laboratory technicians in terms of support to teaching. Gender of science laboratory technicians was found not to significantly influence support to science teaching.

Conclusion: Qualification and years of working experience of science laboratory technicians have been found to significantly influence support to science teaching in secondary schools in Uyo senatorial district of Akwa Ibom state, Nigeria. Technicians with higher qualification and those with many years of experience exhibited higher collaboration with science teachers in effective curriculum implementation. Age and gender of science laboratory technicians do not have significant influence on support to science teaching. Efforts should be made to recruit and sustain the enthusiasm of the young and newly employed science laboratory technicians through adequate motivation like in-service training and incentives so as to encourage their service delivery and support to science teaching. Further training of science laboratory technicians with lower qualifications should be done to improve upon their level of support to science teaching.

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REFERENCES

- Aceska, N. (2016). New Science Curriculum Based on Inquiry Based Learning-A Model of Modern Educational System in Republic of Macedonia. *J. Edu. Sci. Environ. Health (JESEH)*, 2(1): 1-12.
- Hackling, M (2009). The Status of School Science Laboratory Technicians in Australian Secondary Schools. <http://asta.edu.au/generic/file-widget/download/id/354>
- Hackling, M (2011) Laboratory Technicians in Australian Secondary Schools. *Teaching Science*, 55(3), 34-39.
- Lewis, PA; Gospel, H (2015). Technicians under the Microscope: The Training and Skills of University Laboratory and Engineering Workshop Technicians. *J. Voc. Edu. Tr.*, 67(4); 421-441
- Obomanu, BJ; Adaramola, MO (2011). Factors related to Under-Achievement in Science, Technology and Mathematics Education (STME) in Secondary Schools in Rivers State, Nigeria. *World J. Edu.* 1(1); 102-109
- Ogunmade, TO (2005). The Status and Quality of Secondary Science Teaching and Learning in Lagos State, Nigeria. <http://ro.ecu.edu.au/theses/86>
- Omorogbe, E; Ewansiha, JC (2013). The Challenge of Effective Science Teaching in Nigerian Secondary Schools. *Aca. J. Interdis. Stu.* 2(7); 181 – 188
- Ula, WRR; Mariyani, A (2021). The Development of Guided Inquiry Based Science Basic Concept Teaching Materials. *J. Phys. Conference Series* 1842 (2021) 012079 DOI: <https://doi:10.1088/1742-6596/1842/1/012079>

Van't Hooft, M (2005). The effect of the “Ohio school going solar” project on student perceptions of the quality of learning in middle school science. *J. Res. Tech. Edu.* 37(3); 221-244.

Zengele, AG; Alemayehu, B (2016). The Status of Secondary School Science Laboratory Activities for Quality Education in Case of Wolaita Zone, Southern Ethiopia. *J. Educ. Practice.* 7(31), 1 - 11