

Perceived Status of Science Laboratory Facilities in Senior Secondary Schools in Bauchi Metropolis

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ABSTRACT

The study evaluated teachers' perception of science laboratory facilities in senior secondary schools within the Bauchi metropolis, Bauchi State, Nigeria, using a descriptive survey research design. The population consisted of 135 science teachers from schools in the area, and a stratified random sampling technique was employed to select 45 participants. Data was collected using a 16-item Likert-scale questionnaire developed by the researchers. The instrument was validated and piloted, yielding a reliability coefficient of 0.76. Data analysis was carried out using simple percentages. The findings revealed that most schools used general laboratories for all science subjects, while some had separate laboratories for individual subjects. Furthermore, schools had greater access to biology equipment compared to physics and chemistry equipment during practical lessons. Based on these findings, the study recommended that the state government, through the Ministry of Education, prioritize the provision of dedicated laboratories for each science subject. Additionally, the Ministry should regularly monitor and inspect the frequency of laboratory equipment usage by teachers and students.

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INTRODUCTION

Science is the bedrock on which present day technological breakthrough is centred (Danmole, 2012). This is why it is tough at the various levels of education worldwide, the teaching and learning of science is aimed at preparing a child to develop scientific skills that would enable him/her to solve everyday problem (Akambi and Kolawole, 2014). Science subject taught at senior secondary school levels in Nigeria includes; Biology, Chemistry and Physics, while at junior secondary school it is taught as basic science and basic technology. The teaching and learning of these science subjects will prepare the students to make or create choice to study professional courses like Medicine, Pharmacy, Engineering, Agricultural science, Biotechnology and Computer science among others (Muhammad *et al.*, 2023). For the attainment of by these student, the National Policy on Education (FME, 2013) earlier on stipulated that science can only be learned if science teaching equipment are provided and used in the learning process. The science

teaching equipment consist of laboratory facilities that both teach practical activities. By this, the learners would learn science activity through hands-on, mind-on and mouth-on activities. In fact this will shift the teaching of science from teacher-centred approach to student-centred, where student learn science on their own with little support from the teacher. Hence the theoretical learning of science is supported by the use of practical works where laboratory facilities are used. This would assist the students to acquire scientific knowledge and skills. Mohammed (2012) earlier on stated the use of science teaching facilities enhance meaningful learning among students. Therefore, Mohammed, Mahmoud, Ibrahim and Jibrin (2023) emphasized that science teachers should use laboratory facilities to teach science subjects. This would usually engage students in active learning through interaction with the available resources and equipment for acquisition of scientific skills (Leite & Dourado, 2013, Ihejimaizu & Ochui, '2016). This could

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mean that, students should be given opportunity to learn with science learning facilities.

Despite the relevant of laboratory facilities, students' learning and academic performance has not been encourage in both internal and external examinations as reported by Chief Examiners Reports of West African Examination Council (WAEC,2021- 2022). This could be as a result of insufficient instructional materials in the science laboratory or teachers are not using laboratory facilities to teach (Jibrin, Abba & Mohammed, 2021). This would make science teachers to employ the conventional method of teaching which may likely affect the quality of instruction deliver, hence resulting to poor academic performance. In view of this, the present study assessed the status of science laboratory facilities for teaching science in senior secondary schools in Bauchi metropolis

Research Questions

The following research questions guided the study:

1. What is the level of the availability of science laboratories for science teaching in senior secondary school within Bauchi Metropolis?
2. What is the level of accessibility of the laboratory facilities for science teaching in senior secondary school within Bauchi Metropolis?
3. What is the level of utilization of the laboratory facilities for science teaching in senior secondary school within Bauchi Metropolis?

METHODOLOGY

The design for study was descriptive survey research design. The population of the

study consisted of all the one-hundred and thirty-five (135) science teachers in all the public senior secondary school in Bauchi metropolis. Proportionate sampling technique was used to select Forty-five (45) science teachers as sample for the study. The instrument used for data collection was a questionnaire developed by the researchers called Science Laboratory for Teaching Questionnaire (SLTQ). The questionnaire consisted of 16 items developed levels of science laboratories, accessibility and utilization all on of four Likert Scale rating points The instrument was validated by experts in the Department of Science Education, Abubakar Tafawa Balewa University, Bauchi, after which it was pilot tested using split half method. The data collected was analysed using Cronbach Alpha statistics to obtain a reliability coefficient of 0.76. Questionnaire items were constructed to afford answers to the research questions formulated to guide the study. The questionnaire was administered to the respondents, who were the science teachers selected as sample for the study. The respondents were requested to express their opinion in their responses, and collected on the spot to ensure that all the questionnaire distributed were return. The responses were coded to quantitative data and presented for analysis. The data obtained were analysed by simple percentages and the result are presented according to the research questions.

RESULTS

The results are presented in simple percentages as shown in the tables

Research Question 1 What is the level of the availability of science laboratories for science teaching in senior secondary school within Bauchi Metropolis?

Table 1: Percent Level of Availability of Science Laboratories

| ITEM S/N | N | RESPONSE | | | |
|------------------------|----|----------|-------|------|------|
| | | HA | A | NA | UD |
| 1. General laboratory | 45 | 48.9% | 40% | 6.7% | 4.4% |
| 2. Biology laboratory | 45 | 48.8% | 35.6% | 13% | 2.2% |
| 3. Physics laboratory | 45 | 51.1% | 35.6% | 6.7% | 2.2% |
| 4 Chemistry laboratory | 45 | 48.9% | 42.2% | 6.7% | 2.2% |

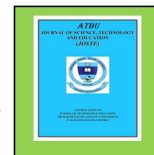
Key: N= Respondents HA-Highly Available, A- Available, NA-Not Available and UD-Undefined

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The level of adequacy of special laboratories for biology, physics and chemistry responses from the respondents indicated that 48.8%, 51.1% and 48.9% laboratories are highly available for biology, physics and chemistry respectively, available with 35.6% for both biology and physics and 42.2% available for chemistry students. Whereas 6.7% of the response from the respondent indicated that, the special laboratories for physics and chemistry are not available for the students with 13% not available for biology students. While 2.2% of the respondents showed that the level of availability of special laboratories for biology, physics and chemistry are undefined respectively. It is revealed that, most of the

response from the respondents indicated that there are available laboratory for physics than the general laboratory, chemistry and biology laboratories. However, this study is contrary to the findings of Ajayi, and Ogu in 2008, which revealed that very few schools were found with laboratories for individual science subjects but rather, general laboratory was used teaching for all the core science subjects. Also reported that, where the laboratory existed, were not well equipped

Research Question 2. What is the level of accessibility of the laboratory facilities for science teaching in senior secondary school within Bauchi Metropolis?

Table 2: Percentage Level of Accessibility of Laboratory Facilities (n =45)

| ITEM | RESPONSE | | | |
|---|----------|-------|-------|-------|
| | VO | O | NO | UD |
| During biology practical students access the laboratory equipment | 48.9% | 42.2% | 6.7% | 2.2% |
| There are laboratory facilities for teaching all topics involved practical in biology | 26.7% | 33.32 | 28.9 | 11.1% |
| During physics practical students access the laboratory equipment | 44.4% | 37.7% | 8.7% | 2.2% |
| There are laboratory facilities for teaching all topics involved practical in physics | 26.7% | 40% | 24.4% | 8.7% |
| During chemistry practical students access the laboratory equipment | 42.2% | 51.1% | 6.7% | 0% |
| There are laboratory facilities for teaching all topics involved practical in chemistry | 31.1% | 40% | 17.8% | 11.1% |

Key: VO-Very Okay, O- Okay, NO- Not Okay and UD- Undefined,

The respondents' responses indicated that 48.9%, 44.4% and 42.2% of the students during biology, physics and chemistry practical students accessed laboratory equipment very okay respectively and with 42.2%, 37.7% and 51.1% okay respectively.

Also the present study assessed the level of accessibility of laboratories facilities during biology, physics and chemistry and found that, accessibility of students to laboratory equipment were not okay with 6.7% for both biology and chemistry with 8.7% for physics practical. While, the decision level revealed that student accessed science laboratories during practical's with 45.6 %, 41.1 % and 46.7 % during biology, physics and chemistry practical's respectively

Most of the respondents' responses indicated that, students usually have access to laboratory equipment during sciences practical. Hence, this finding confirms the earlier studies of Nwagbo and Uzoma (2014) and Oluwasegun, Ohwofosirai & Emaghetere (2015) whose findings revealed that students during practical activities have access to used laboratory equipment that helps in enhancing science process skills.

Research Question 3. What is the level of utilization of the laboratory facilities for science teaching in senior secondary school within Bauchi Metropolis?

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Table 3: Percentage Level of Utilization of Laboratories Facilities (n = 45)

| ITEM | RESPONSE | | | |
|---|----------|-------|-------|-------|
| | VLE | LE | SE | NA |
| 1. Biology practical students use laboratory equipment | 40% | 46.7% | 13.3% | 0% |
| 2. Biology practical students find it difficult to use laboratory equipment | 13.3% | 24.4% | 17.8% | 44.4% |
| 3. Physics practical students use laboratory equipment | 35.6% | 48.9% | 15.6% | 2.2% |
| 4. Physics practical students find it difficult to use laboratory equipment | 11.1% | 26.7% | 20% | 31.1% |
| 5. Chemistry practical students use laboratory equipment | 42.2% | 51.1% | 6.7% | 0% |
| 6. Chemistry practical students find it difficult to use laboratory equipment | 6.7% | 28.9% | 17.8% | 46.7% |

KEY: VLE= Very Large Extend, LE- Large Extend, SE- To a Small Extend and NA = Not at all.

The responses of the respondents indicated that laboratories equipment are utilized to a very large extend with 40% for during biology practicals, but 13.3% indicated their difficulty in using the equipment. While 35.6% revealed how equipment are used in physics practical and 11.1% difficulty in handling physics equipment. During chemistry practical, there was 42.2% usage of the equipment. The responses from the respondents further showed that 46.7%, 48.9% and 51.1% of the laboratories equipment are utilized to a large extend during biology practical physics and chemistry practical respectively. This study is line with work of Ismail and Lukman (2022), they reported that the level of availability and utilization of instructional materials in teaching and learning biology in senior secondary schools are mostly available while others are not, however the materials are not regularly utilized by the teachers. This also confirm the work of Mogaka in 2019, he reported statistically significant positive relationship between availability and utilization of laboratory equipment and students' academic achievement. This implies that utilization of laboratory equipment for basic science subject is effective in the teaching and learning of science and also students who utilize laboratory equipment achieve higher than their counterparts academically.

CONCLUSION

In conclusion, the findings of this research clearly indicate that the availability, utilization, and accessibility of laboratory equipment were adequate, which directly or indirectly contributes to improved student

performance. The presence of well-equipped laboratories provides students with hands-on experience and practical exposure, allowing them to better understand theoretical concepts and develop essential scientific skills. This experiential learning enhances students' comprehension and retention of subject matter, fostering higher levels of engagement and interest in science subjects. When students are regularly exposed to laboratory equipment, they not only gain confidence in performing experiments but also develop critical thinking and problem-solving abilities. Consequently, this practical exposure has a positive impact on their overall academic performance and prepares them for future scientific endeavors. Therefore, ensuring the availability and consistent use of laboratory facilities is crucial for promoting quality education and optimizing student outcomes in science education.

RECOMMENDATIONS

In the light of the findings of the study, the researchers recommended the following:

1. The government should provide laboratory for each of the science subject
2. Government should provide sufficient science teaching equipment
3. Both science teachers and the students always endeavour to utilize laboratory equipment for teaching and learning of the science subjects.
4. Supervisors and inspectors from the Ministry of Education should strictly monitor and ensure the frequency of use of laboratory equipment by both teachers and students.

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