













Table 11. The correlation of the use of chemistry laboratory with academic achievement of students in chemistry.

| Correlation  |             |                      |
|--|-------------|----------------------|
| N = 408  |             |                      |
| Items  |             |                      |
| Laboratory rooms are used in the school to teach practical activities in chemistry (CL Item 1)       | Correlation | 0.216 <sup>**</sup>  |
|  | Sig.        | 0.000                |
| Chemistry equipments, apparatus or material and chemicals are used in the school (CL Item 2)         | Correlation | 0.221 <sup>**</sup>  |
|  | Sig.        | 0.000                |
| Chemistry teachers have an instructional plan to teach practical activities in chemistry (CL Item 3) | Correlation | 0.509 <sup>**</sup>  |
|  | Sig.        | 0.000                |
| Chemistry teachers demonstrate and explain use of equipment to students (CL Item 4)                  | Correlation | 0.762 <sup>**</sup>  |
|  | Sig.        | 0.000                |
| Students actively participate in chemistry laboratory (CL Item 5)                                    | Correlation | 0.879 <sup>**</sup>  |
|  | Sig.        | 0.000                |
| Chemistry equipments, apparatus or material and chemicals are misused in the school (CL Item 6)      | Correlation | -0.151 <sup>**</sup> |
|  | Sig.        | 0.002                |

\*\* . Correlation is significant at the 0.01 level (2-tailed). C L= Chemistry Laboratory

Similarly, the items of the use of Physics laboratory were indexed and the mean scores for the use of physics laboratory for each item shown in table 5. Teachers' having instructional plan to teach practical activities in physics, the use of physics laboratory equipments and apparatus to teach practical activities by teacher, the degree to which students work with materials, apparatus and the degree to which teachers assist students to work with physics laboratory equipments were positive and significantly associated with academic achievements of students in physics. Nevertheless, the misuse of physics equipments in the school/s ( $r = -0.118$ ) was negatively correlated to academic achievements of students in physics (table 12). A study conducted in Nigeria showed that the poor state of performance as well as the mass failure of physics in senior secondary schools is linked to the level of availability and utilization of physics laboratory equipment in Nigerian senior secondary schools (Olufunke, 2012). It further revealed that available and utilized physics laboratory equipment depends largely on the ownership of the schools. The study concluded that science laboratory is a critical variable in determining the quality of output from secondary schools.

Table 5: Analysis of the use of physics laboratory

| Questionnaire Items |           |           |           |           |           |           |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                     | PL Item 1 | PL Item 2 | PL Item 3 | PL Item 4 | PL Item 5 | PL Item 6 |
| Mean                | 1.87      | 1.79      | 1.50      | 1.67      | 1.94      | 0.59      |
| Minimum             | 0         | 0         | 0         | 0         | 0         | 0         |
| Maximum             | 4         | 4         | 4         | 4         | 4         | 4         |

PL –Physics laboratory

Table 12. The correlation of the use of physics laboratory with academic achievement of students in physics.

| Correlation   |             |         |
|---|-------------|---------|
| No. of Schools: Science Students—N = 408  |             |         |
| Items   |             |         |
| Laboratory rooms are used in the school to teach practical activities in Physics (PL Item 1)      | Correlation | 0.092   |
|   | Sig.        | 0.064   |
| Physics equipment's, apparatus or material are used in the school (PL Item 2)                     | Correlation | 0.509** |
|   | Sig.        | 0.000   |
| Physics teachers have an instructional plan to teach practical activities in physics (P L Item 3) | Correlation | 0.412** |
|   | Sig.        | 0.000   |
| Physics teachers assist students with practical work in the laboratory (PL Item 4)                | Correlation | 0.031   |
|   | Sig.        | 0.539   |
| Students actively participate in the Physics laboratory (PL Item 5)                               | Correlation | 0.104*  |
|   | Sig.        | 0.036   |
| Physics equipments, apparatus and material are misused in the school (PL Item 6)                  | Correlation | -0.118  |
|   | Sig.        | 0.711   |

\*\* . Correlation is significant at the 0.01 level (2-tailed). P L= Physics Laboratory

*The differential impact of the use of science laboratory on academic achievement of students.*

The regression analysis about (BL Item 3), (BL Item 2) and (BL Item 5) were significant (P<0.05). The variable (BL Item 2) and (BL Item 5) have negative t-value while (BL Item 3) has positive. In the contrary, the regression analysis about (BL Item 1), (BL Item 6) and (BL Item 4) was insignificant (P>0.05) (table 14). This indicates that the proper utilization of laboratory inputs, teacher's guidance and planning to teach practical, the active participation of students during practical activities are the predictors of academic achievement of students in biology.

Table 14. Stepwise regression analysis of the use of biology laboratory on academic achievement of students in Biology

| Coefficients <sup>a</sup>  |        |      |
|--|--------|------|
| N= 408   | t      | Sig. |
| Biology teachers have an instructional plan to teach practical activities in (BL Item 3)   | -3.997 | .000 |
| Biology equipment's, apparatus or material are used in the school (BL Item 2)  | 3.979  | .000 |
| Students actively participate in the biology laboratory (BL Item 5)  | 1.966  | .030 |
| a. Dependent Variable: academic achievement of students in biology   |        |      |
| Excluded Variables <sup>a</sup>  |        |      |
|  | t      | Sig. |
| Laboratory rooms are used in the school to teach practical activities in biology (B L Item 1)  | -1.948 | .052 |
| Biology equipments, apparatus or material and chemicals are misused in the school (BL Item 6)  | -.714  | .476 |
| Biology teachers assist students with practical work in the laboratory (BL Item 4)   | -1.694 | .091 |
| a. Dependent Variable: academic achievement of students in biology   |        |      |
| b. Predictors in the Model: (Constant), Biology teachers have an instructional plan to teach practical activities in biology, Biology equipment's and apparatus are used in the school, Students actively participate in the biology laboratory (BL Item 5). |        |      |

N= number of students, BL= biology laboratory

Similarly, the regression analysis about (CL Item 2) (CL Item 3) and (CL Item 4) has a significant and positive relationship. The value of t is negative for (CL Item 2) and (CL Item 3) while positive for (CL Item 4). However, the regression analysis about (CL Item 1), (CH L Item 5) and (CH L Item 6) are insignificant (p>0.05) and t-value is negative for (CL Item 1) and (CL Item 6) and positive for (CL Item 5) (table 15). This shows that the proper utilization of chemistry laboratory inputs, teacher's guidance and planning to teach practical, the active participation of students during practical activities are the predictors of academic achievement of students in chemistry.

Table 15. Stepwise regression analysis of the use of chemistry laboratory on academic achievement of students in chemistry

| <b>Coefficients<sup>a</sup></b>  |        |       |
|--|--------|-------|
|  | t      | Sig.  |
| Chemistry teachers have an instructional plan to teach practical activities in chemistry (CL Item 3)   | -1.975 | 0.049 |
| Chemistry equipment, apparatus and material are effectively used in the school (C L Item 2)  | -2.252 | 0.025 |
| Chemistry teachers assist students with practical work in the laboratory (CL Item 4)   | 4.627  | 0.000 |
| Students actively participate in chemistry laboratory (CL Item 5)  | 0.517  | 0.015 |
| <b>Excluded Variables<sup>a</sup></b>  |        |       |
|  | t      | Sig.  |
| Laboratory rooms are used in the school to teach practical activities in chemistry (C L Item 1)  | -0.796 | 0.427 |
| Chemistry equipment, apparatus or material and chemicals are misused in the school (CL Item 6)   | -0.140 | 0.889 |
| a. Dependent Variable: academic achievement of students in chemistry   |        |       |
| b. Predictors in the Model: (Constant), chemistry teachers have an instructional plan to teach practical activities in chemistry, chemistry equipment, apparatus /material are used in the school, chemistry teachers assist students with practical work in the laboratory, Students actively participate in chemistry laboratory |        |       |

N= number of students, C L= Chemistry Laboratory

The regression analysis about the extent of students work with materials, apparatus and instruments in the school laboratory (PL Item 5) and teachers having an instructional plan to teach practical activities in physics (PL Item 3) are positively correlated ( $p < 0.05$ ). Both (PL Item 3) and (PL Item 5) have negative t- value. All the other items are insignificant and negative t-value (table 15). This shows that, teacher's guidance and planning to teach practical and the active participation of students during practical activities are the predictors of academic achievement of students in physics according to this study.

Table 15. Stepwise regression analysis of the use of physics laboratory on academic achievement of students in physics

| <b>Coefficients<sup>a</sup></b>   |        |       |
|---|--------|-------|
| Model   | t      | Sig.  |
| Students actively participate in the physics laboratory (PL Item 5)   | -2.991 | 0.003 |
| Physics teachers have an instructional plan to teach practical activities (PL Item 3)   | -2.128 | 0.034 |
| a. Dependent Variable: Academic Achievement of students in Physics  |        |       |
| <b>Excluded Variables<sup>a</sup></b>   |        |       |
|   | t      | Sig.  |
| Laboratory rooms are used in the school to teach practical activities (P L Item 1)  | -1.186 | 0.236 |
| Physics equipment, apparatus and materials are used in the school (P L Item 2)  | -0.343 | 0.732 |
| Physics teachers assist students with practical work in the laboratory (PL Item 4)  | -0.552 | 0.581 |
| Physics equipment, apparatus or Material are misused in the school (P L Item 6)   | -0.140 | 0.889 |
| a. Dependent Variable: Academic Achievement of students in Physics  |        |       |
| b. Predictors in the Model: (Constant), physics teachers have an instructional plan to teach practical activities in physics, Students Work with materials, apparatus and instruments in the school laboratory. |        |       |

N= number of students, P L= Physics Laboratory

In conclusion, the availability and effective utilization of science laboratory resources has a positive influence on the academic achievement of students in biology, chemistry and physics. Poor state performance of students in biology, chemistry and physics in secondary schools of Ilu Abba Bora Zone is significantly associated with the level of availability and utilization of science laboratory resources in the schools besides other factors. To this extent,

concerned governmental and non-governmental institutions should take necessary interventions to overcome the current problem in the high schools of the Ilu Abba Bora zone.

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