

# INVESTIGATION INTO TOPICS STUDENTS AND TEACHERS FIND DIFFICULT IN SCIENCE SYLLABUS: A CASE STUDY OF OHAUKWU LOCAL GOVERNMENT AREA OF EBONYI STATE

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## Abstract

The aim of this research work is to investigate the topics students and teachers find difficult in Basic Science syllabus in junior secondary schools in Ohakwu Local Government Area of Ebonyi State. They were total population of three hundred and twenty students (320) and eighty basic science teachers (80) in the state, stratified and proportionate sampling technique was adopted to select. The sampling population constitutes about 50% of the total population of the selected eight schools in the state. Sampling population of one hundred and sixty (160) students for junior secondary (JSS 3) students were used in the research because they have covered Basic Science syllabus. Forty Basic Science teachers were also selected for the research. The instruments used for data collection were objective questions of sixty items chosen from past junior secondary schools certificate examination questions. The questions were chosen in a way that all the topics in basic science syllabus were represented. A questionnaire comprising of thirty topics were administered to basic science teachers in order to know the topics they find easy or difficult. The result show that students find most of the topics easy with exception of circulatory system, disease vectors and control, ecology etc. it is observed that concept perceived difficult by teachers are also difficult to students. It is therefore suggested that those topics teachers and students find default should be modified.

## Introduction

### 1.1 Background of the Study

The relevance of science in our present day society cannot be over emphasized. Science education is needed greatly especially at this age of technological advancement where the quest of man is to explore and get more understanding about his surroundings.

Woodboin and Obown (2019) defined Science with ever increasing accuracy, “the event and circumstances that occur or exist within our natural environment”.

Awachie (2018) opines that Science as a subject is concerned with material universe, seeking to discover facts about it and to fit those facts into conceptual schemes called theories or laws that will clarify the relations among them.

Okeke and Ekpe (2015) observed that science must begin with observation of subjects or events in the physical universe.

Bajah (2020) stated that “Science is an undertaking marked by initiative, energy boldness and intrepid drive”.

The Scientific methods includes research, conducting experiment, discoveries, innovation, exploration, inventing new things and the possible ways of improving the existing ones. These methods of science are ever used in the effective teaching and learning of sciences at all levels of education.

The secondary schools, as an Integral component of the scientific structure supplies candidate to be trained in science and technology in our higher institutions of learning. The post primary school is thus the vehicle for shaping positive attitude towards modernization. This is because the secondary is the first institution of learning that exposes a child to different aspects of science and technology through the teaching and learning of Sciences. But contrary to that expectation with respect to Ohaukwu Local Government Area.

Secondary schools are not fulfilling all their necessary tasks. This is because research has revealed that less than 30% of students in the senior secondary classes in schools under review are in the science stream judging from the previous schools’ results, it is only very few of this small percentage is expected to make excellent grades in senior secondary schools certificate examination, adding to the fact it may not be possible for all those with successful result to proceed to institution of higher learning with the purpose to study science based course. The attendant consequence is that their scientific and technological objectives and that of the whole nation at large may be halted thereby hampering the whole areas of development of the nation.

Another observation reveals that most of the students due attach difficulty to science in general and as a result of this develop a lukewarm attitude towards science.

Davis (2017), also noted that there might be topics and concepts in Science course books which teachers and students may find difficult to deal with.

Mani (2016) in his own view observed the “the teaching and learning of Science in Nigeria has been facing with a lot problem, such as lack of science teaching equipment, students’ poor attitude in science, inadequacy or absence of qualified teachers”.

Another observed fact is that some of the topic in science syllabus are not covered (left untaught) by some teachers, yet students are expected to write them in examination and even when such topic are being taught by some teachers they will not teach them in detail thereby scaring students the more.

In view of this above observations that made the researcher to investigate or study the area in science syllabus that both teachers and students find difficult.

### **Statement of the Problem**

Science is one of the core subjects offered in three years out of six years secondary school education in Nigeria, which is devised with the aim to give a child the ability to:

- a. Gain the principles of the fundamental unity of science.

- b. Gain the commonality of approach to problem of scientific nature.
- c. Gain an understanding of roles and functions of science in our everyday life and the world in which he lives.

However, observation has shown that the performance of students in this subject is considerably very poor due to some difficult concepts in it.

In spite of all the emphasis on the relevance of science to national development, there are still very scanty number of students who opt for science and mass failure by those who opt for them in various terminal examination (Junior Secondary School Certificate and Senior Secondary Certificate Examination alike). This implies that there is something wrong in teaching and learning of science especially at the senior Secondary School Level where firm foundation is to be laid.

These general poor performance are through to be due to low or lack of interest in science subjects by the students which may be traceable to some difficult topics in the subject.

### **Aim and Objective of the Research**

The aim of this research work is an investigation into the topics students and teachers find difficult in science syllabus.

Specific objectives:

- I. Determine the topics which Science students find difficult.
- II. Identify the topics, which the Science teachers find difficult in the subject's syllabus.

### **Significance of the Study**

The research will be of great value in various ways. Firstly, the research will help to find out the major areas of difficulty in teaching and learning of Science in senior Secondary Schools (SSS 1) of Nigeria.

I hope that by finding out these problems, government attention, education planners, book writers and public- spirited individuals and organizations will be drawn to the subject.

Secondly, the study will help to suggest what could be done to improve the teaching and learning of Science in Nigeria Secondary Schools.

Again, the study will help to stimulate public awareness and interest in the area of Science and may of course ginger further researchers not only in the subject (i.e, Science) but also in other related course/subjects.

### **Scope of the Study**

The research will be conducted in Ohaukwu Local Government Area of Ebonyi State. Senior Secondary School one (SSS 1) students in all the schools selected in the Local Government will be used for the study. Also science teachers in all these schools were chosen for the research.

### **Research Questions**

In order to achieve the objectives of this study, the researcher will find out the answers to the following questions:

1. What are the topics in science syllabus students find difficult?
2. What are the topics that are so difficult to teachers in science syllabus?
3. What topics do both teachers and students find difficult in science?

### **Limitation of the Study**

In carrying out the research work, the researcher was unable to consult the curriculum planners for necessary information concerning the production of simple textbooks and teachers' guide students because of time constraint, resource and lack of communication between the researcher and the curriculum planners.

Because of the nature of instrument used for the data collection, the researcher was not able to assess the degree of difficulty.

All boards of educations, ministry of education and other educational agencies were not consulted for necessary information.

### **Research Methodology**

#### **The Research Design**

It is carried out using a survey research method. It finds out the areas of difficulty in science as encountered by teachers and students in the subject syllabus.

#### **Area of the Study**

The study was carried out in Ohaukwu Local Government Area of Ebonyi State making up of five communities.

- Umuezeka, Ukwagba, Amoffia, Okposhi ehuku, Umuogudu akpu

#### **Population of the Study**

The population of senior secondary one students (SSS 1) was three hundred and twentieth (320) students and Science teachers with population of eighty (80), in Ohaukwu Local Government Area of Ebonyi State.

## Sample and Sampling Techniques

Out of the total population of three hundred and twenty (320) senior secondary (SSS 1) students and eighty (80) basic science teachers in the state, stratified and proportionate sampling technique was adopted to select. This constitutes about 50% of the total population of the selected eight schools in the state.

The sample covered eight schools in the Local Government Area. The schools were chosen according to the communities that make up the Local Government Area. Twenty students were selected from senior secondary (SSS 1) in each school in the communities under random sampling. Hundred and sixty students were chosen from the selected schools. Again, five (5) science teachers from each school were chosen as respondents to the questionnaire distributed to them, so that a total of forty (40) teachers were selected. Population of the students and teachers are shown in table 1.

**Table 1: Population of the Students and Teachers**

| S/N | NAMES OF SCHOOLS                          | NO OF STUDENTS | NO OF TEACHERS |
|-----|-------------------------------------------|----------------|----------------|
| 1   | Community Secondary School Amoffia        | 20             | 5              |
| 2   | Umuezeaka High School                     | 20             | 5              |
| 3   | Ijinike High School                       | 20             | 5              |
| 4   | Community Secondary School Umuogudu Oshia | 20             | 5              |
| 5   | Girls Secondary School Ngbo               | 20             | 5              |
| 6   | Federal Girls College Ezzangbo            | 20             | 5              |
| 7   | Ukwagba Community Secondary School        | 20             | 5              |
| 8   | Community Secondary School Okoshehuku     | 20             | 5              |
|     | TOTAL                                     | 160            | 40             |

## Instrument for Data Collection

The researcher used objective questions of sixty questions taking from previous senior secondary school examination, which were administered to the students. The questions were selected so that all the topics in the subject (Science) syllabus are covered. These questions were however given to the students only to answer for the purpose of this work. This will be shown in appendix I.

Also a set questionnaire consisting of thirty five topics were given to science teachers, so that their areas of difficult will be identified in the subject syllabus.

## Method(s) for Data Collection

The objective tests were administered to the students by the researcher. The researcher supervised the exercise in each of the schools to avoid manipulation, cheating and missing any of the items.

Also the questionnaire were given to science teachers, who gave their responses by ticking either easy, very easy, very difficult, difficult, indifference. These were collected immediately after their responses were completed.

### Method of Data Analysis

The data analyses were based on the frequencies of the responses of students and teachers. The data collected from the eight schools were joined together for the analyses. The analysis were based on percentage from the result, 50% was taken as cut-off point. This implies that at 50% the topic is neither difficult nor easy (i.e neutral). Thus, a topic is difficult to both teachers and students, if the percentage is 49 and below, while a topic is considered easy if the percentage is 51 and above.

### Data Presentation and Analysis

This chapter deals with the analysis of the data collected for the study. Simple percentage was used for the analysis. Here a topic is considered difficult if it has 49% and below. While the topic is considered easy if it is above 50% while 50% is neutral.

**Research Question 1** What are the topics (concepts) in Basic Science syllabus that students find difficult?

**Table 2: The Summary of Students' Responses**

| S/N | TOPICS                                  | TOTAL<br>NUMBER | NUMBER<br>PASSED | NUMBER<br>FAILED | % PASSED | % FAILED | RESULT    |
|-----|-----------------------------------------|-----------------|------------------|------------------|----------|----------|-----------|
| 1.  | Living things and their characteristics | 160             | 144              | 16               | 90%      | 10%      | Easy      |
| 2.  | Parts of human body                     | 160             | 128              | 32               | 80%      | 20%      | Easy      |
| 3.  | Feeding                                 | 160             | 130              | 30               | 81%      | 19%      | Easy      |
| 4.  | Food shortage                           | 160             | 134              | 26               | 84%      | 16%      | Easy      |
| 5.  | Excretory system                        | 160             | 102              | 58               | 64%      | 36%      | Easy      |
| 6.  | Respiratory System                      | 160             | 104              | 56               | 65%      | 35%      | Easy      |
| 7.  | Circulatory system                      | 160             | 60               | 100              | 37.5%    | 62.5%    | Difficult |
| 8.  | Digestive system                        | 160             | 90               | 70               | 56%      | 44%      | Easy      |
| 9.  | Reproductive system                     | 160             | 80               | 80               | 50%      | 50%      | Easy      |
| 10. | Growth development                      | 160             | 125              | 35               | 78%      | 22%      | Easy      |
| 11. | Health and maintenance                  | 160             | 98               | 62               | 61%      | 39%      | Easy      |
| 12. | Disease Vectors and control             | 160             | 50               | 110              | 31%      | 69%      | Difficult |
| 13. | Immunization                            | 160             | 95               | 65               | 59%      | 41%      | Easy      |
| 14. | Environment sanitation                  | 160             | 85               | 75               | 53%      | 47%      | Easy      |
| 15. | Pollution                               | 160             | 98               | 62               | 61%      | 39%      | Easy      |
| 16. | Ecology                                 | 160             | 70               | 90               | 44%      | 56%      | Easy      |
| 17. | Matter                                  | 160             | 144              | 16               | 90%      | 10%      | Easy      |

|     |                                          |     |     |     |     |     |           |
|-----|------------------------------------------|-----|-----|-----|-----|-----|-----------|
| 18. | Physical change                          | 160 | 125 | 35  | 78% | 22% | Easy      |
| 19. | Element, compound and mixture            | 160 | 95  | 65  | 59% | 41% | Easy      |
| 20. | Chemical Change                          | 160 | 96  | 64  | 60% | 40% | Easy      |
| 21. | Chemical Symbols, formulae and equations | 160 | 55  | 105 | 34% | 66% | Difficult |
| 22. | Atomic structure                         | 160 | 104 | 56  | 65% | 35% | Easy      |
| 23. | Air and water                            | 160 | 130 | 30  | 81% | 19% | Easy      |
| 24. | Nitrogen and its properties              | 160 | 125 | 35  | 78% | 22% | Easy      |
| 25. | Metals and non-metals                    | 160 | 134 | 26  | 84% | 16% | Easy      |
| 26. | Rusting                                  | 160 | 120 | 40  | 75% | 25% | Easy      |
| 27. | Activity Series                          | 160 | 57  | 103 | 34% | 64% | Difficult |
| 28. | Acid, bases and salt                     | 160 | 37  | 123 | 23% | 77% | Difficult |
| 29. | Man in space                             | 160 | 40  | 120 | 25% | 75% | Difficult |
| 30. | Energy and its conversion                | 160 | 128 | 32  | 80% | 20% | Easy      |
| 31. | Work                                     | 160 | 48  | 112 | 30% | 70% | Difficult |
| 32. | Tools for work                           | 160 | 95  | 65  | 59% | 41% | Easy      |
| 33. | Controlling weather                      | 160 | 150 | 10  | 94% | 6%  | Easy      |
| 34. | Kinetic theory                           | 160 | 96  | 54  | 60% | 40% | Easy      |
| 35. | Force                                    | 160 | 26  | 144 | 16% | 84% | Difficult |

The table above shows the result of student's reaction to the objective test given to them.

From the result, nine topics were considered difficult by the students.

These topics include:

- Circulatory system , Disease vectors and control, Ecology, Chemical symbols, formulae and equations, Activity series, Acids, bases and salts , Man in space , Work, Forces.

## Research Question 2

What are the topics in Basic Science syllabus that teachers find difficult?

In order to provide answers to the question, the response given by Basic Science teachers as in items 1 – 35 in table 2 above, was analyzed and summarized as in table 3 which is shown below. In the table, the first column indicates the concepts (items). The second column depicts the total number of responses collected. Third and fourth columns show the number that find the topic easy and difficult respectively. While fifth, sixth and last column in the table indicate percentage of easiness, percentage of difficult and result respectively.

**Table 3: The Summary of Teachers' Responses and Result**

| S/N | TOPICS                                   | OF<br>TOTAL<br>NO<br>RESPONDENTS | EASY | DIFFICULT | % AGES OF EASINESS | % AGE OF DIFFICULT | RESULT    |
|-----|------------------------------------------|----------------------------------|------|-----------|--------------------|--------------------|-----------|
| 1.  | Living things and their characteristics  | 40                               | 36   | 4         | 90%                | 10%                | Easy      |
| 2.  | Parts of human body                      | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 3.  | Feeding                                  | 40                               | 30   | 10        | 75%                | 25%                | Easy      |
| 4.  | Food storage                             | 40                               | 30   | 10        | 75%                | 25%                | Easy      |
| 5.  | Excretory System                         | 40                               | 29   | 11        | 73%                | 27%                | Easy      |
| 6.  | Respiratory System                       | 40                               | 22   | 18        | 55%                | 45%                | Easy      |
| 7.  | Circulatory System                       | 40                               | 18   | 22        | 45%                | 55%                | Easy      |
| 8.  | Digestive System                         | 40                               | 26   | 14        | 65%                | 35%                | Easy      |
| 9.  | Reproductive System                      | 40                               | 24   | 16        | 60%                | 40%                | Easy      |
| 10. | Growth development                       | 40                               | 22   | 18        | 55%                | 45%                | Easy      |
| 11. | Health and maintenance                   | 40                               | 38   | 12        | 70%                | 30%                | Easy      |
| 12. | Disease Vectors and control              | 40                               | 38   | 2         | 95%                | 5%                 | Easy      |
| 13. | Immunization                             | 40                               | 26   | 14        | 65%                | 35%                | Easy      |
| 14. | Environment sanitation                   | 40                               | 34   | 6         | 85%                | 15%                | Easy      |
| 15. | Pollution                                | 40                               | 32   | 8         | 80%                | 35%                | Easy      |
| 16. | Ecology                                  | 40                               | 26   | 14        | 65%                | 35%                | Easy      |
| 17. | Matter                                   | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 18. | Physical change                          | 40                               | 34   | 6         | 85%                | 15%                | Easy      |
| 19. | Element, compound and mixture            | 40                               | 20   | 20        | 50%                | 50%                | Neutral   |
| 20. | Chemical Change                          | 40                               | 22   | 18        | 55%                | 45%                | Easy      |
| 21. | Chemical Symbols, formulae and equations | 40                               | 18   | 22        | 45%                | 55%                | Easy      |
| 22. | Atomic structure                         | 40                               | 30   | 10        | 75%                | 25%                | Easy      |
| 23. | Air and water                            | 40                               | 36   | 4         | 90%                | 10%                | Easy      |
| 24. | Nitrogen and its properties              | 40                               | 30   | 10        | 75%                | 25%                | Easy      |
| 25. | Metals and non-metals                    | 40                               | 36   | 4         | 90%                | 10%                | Easy      |
| 26. | Rusting                                  | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 27. | Activity Series                          | 40                               | 26   | 14        | 65%                | 35%                | Easy      |
| 28. | Acid, bases and salt                     | 40                               | 14   | 26        | 35%                | 65%                | Difficult |
| 29. | Man in space                             | 40                               | 12   | 28        | 30%                | 70%                | Difficult |
| 30. | Energy and its conversion                | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 31. | Work                                     | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 32. | Tools for work                           | 40                               | 32   | 8         | 80%                | 20%                | Easy      |
| 33. | Controlling weather                      | 40                               | 38   | 2         | 95%                | 5%                 | Easy      |
| 34. | Kinetic theory                           | 40                               | 32   | 18        | 55%                | 45%                | Easy      |
| 35. | Force                                    | 40                               | 12   | 28        | 40%                | 60%                | Easy      |



In the table above, five topics were perceived to be difficult by Basic Science teachers.

The topics as shown in the table includes:

- Circulatory system, Chemical symbols, formulae and equations, Acids, bases and salts
- Mans in space, Force.

In the first topic found difficult, that is circulatory system, the total number of teachers is forty showing that all the teachers ticked the column. Eighteen teachers found it easy while twenty-two teachers found it difficult. The percentage easiness and difficult are 45% and 55% respectively.

### Research Question 3

In order to compare the topic found difficult by both teachers and students, the researcher asked this question:

Which topics do teachers and students find difficult in Basic Science Syllabus?

From the responses, the research question one and two above, there are some topics which both teachers and students found difficult. This is shown in table four below.

**Table 4: Difficult Topics as Perceived by both Teachers and Students**

| S/N | Topics                                   | Percentage of difficulty to students | Percentage of difficulty to teacher |
|-----|------------------------------------------|--------------------------------------|-------------------------------------|
| 1   | Circulatory system                       | 62.5%                                | 55%                                 |
| 2   | Chemical symbols, formulae and equations | 66%                                  | 55%                                 |
| 3   | Acids, bases and salts                   | 77%                                  | 65%                                 |
| 4   | Man in space                             | 75%                                  | 70%                                 |
| 5   | Forces                                   | 85%                                  | 60%                                 |

From the table, the percentage of difficulty is much higher to students than teachers. For instance, “man in space” and “acids, bases and salts” presented a lot of difficulty to both teachers and students. Teachers complained of non-availability of supporting simple texts based on space science. Most of the students see it more as fiction and full of abstraction.

### Findings

1. The researcher was able to find out that students find most of topics easy except the following concepts.

- Circulatory system, Disease vectors and control, Chemical Symbols, formulae and equations, Ecology, Activity series, Acids, bases and salts, Man in space, Work. Forces.

2. Teachers also find most of the topics easy except these five concepts.

- Circulatory system, Chemical symbols, formulae and equations, Acids, bases and salts.  
Man in space, Forces.

## Discussions

From the result in table 2 as stated in the findings above, certain topic are difficult to students.

These concepts include:

- Circulatory system, Disease vectors and control, Ecology, Chemical symbols, formulae and equations, Activity series, Acids, bases and salts, Man in space, Work, Forces.

Taking a look on the results, it can be detected hat majority of the difficult concepts are from the physical sciences. These findings are in agreement with editorial view-point of science Teachers' Association of Nigeria (STAN) 1978, which pointed out that physical sciences are more difficult to understand. Some of these difficulties could be attributed to the maturation stage of students, lack of adequate teaching materials/equipment, the language used in instruction, inadequate or unqualified teachers teaching personnel and abstract nature of the concepts etc.

Finding from the students' responses revealed that most of them did not do ecology at all. Few students who studied the concepts found it difficult because most of the teachers did not teach this particular topic as it is in the syllabus.

In table 3, the difficult Basic Science concepts as perceive by teacher are: Circulatory system; chemical symbols, formulae and equations; acids, bases and salts; man in space and forces. Acids bases and salts were rated the most difficult, followed by man in space etc. this is in line with editorial view of STAN (2015) that physical sciences are more difficult than the biological sciences.

In table 4 five concepts were seen difficult by both teachers and students. These topics include:

- Circulatory system, Chemical symbols, formulae and equations. Acids, bases and salts.  
Man in space, Forces.

Observations had it that students found most of the concepts more difficult than teachers. This is a great indication that some teachers do not have proper understanding of their students' difficulties. The concept "man in space" is considered very abstract and lacks teaching materials that can make it more meaningful to learners. In support to this, Science Teachers Association of Nigeria (STAN) 2015 difficulties to both teachers and students. Teachers complain about non-availability of supporting simple textbooks on space travel/science. Moreover, there is a common observation that most of the students saw the concept-man in space as an abstract topic or concept.

This topic therefore needed materials for effective teaching and learning, other than simple textbooks. Again Okoli (2018) is of the view that topics which have a lot of activities arouse the interest of students and more generally easy to understand.

Also from the qualification of teachers, more than 78% of the teachers are not graduate of Basic Science. Therefore, supporting the findings of the researcher.

## **Conclusion**

Basic Science is one of the core subjects to be given to a child during his/her early stages of secondary school-junior secondary school. The researcher has discovered that some topics are difficult to both teachers and their students.

In order to meet the demand of the nation's developmental challenges, the researcher is of the view that for the effective teaching and learning of science especially Basic science, the teachers must be resourceful, creative skillful and dedicated in imparting the scientific knowledge and attitude to children during this early stage of science education so that students will develop a keen interest towards science.

Again, in order to meet the objective of teaching science in the junior secondary school according to Nigerian Integrated Science Project (NISP) series, adequate instructional materials should be provided for the effective teaching and learning of Basic Science.

## **Recommendations:**

- i. The researcher recommends that seminars, workshops and conferences should be organized and participations should be made compulsory for all Basic Science Teachers. The seminars and workshops as well as conferences should be organized at National, State and Local Government levels.
- ii. The Science Teachers Association of Nigeria (STAN), the ministries of education and public spirited educationists should be actively committed to the workshops, conferences, seminars and refresher courses by well should providing necessary funds and materials. The teacher as well should endeavor to update their certificates in order to be qualified for teaching of the subject. In-service training is necessary for this group of teachers.

- iii. Planners of the curriculum should try to examine deeply these areas of difficulties in the subject and provide textbooks with simplified teacher's guide and practical guide to students.
- iv. Government should provide teaching materials for teachers and students of Basic Science especially in those areas of difficulty. This will reduce the tension and as well as arouse their interest, active participation and performances of both teachers and students.
- v. Science teachers should also encourage students by making their lessons more interesting through improvisation of some of the teaching aids. The use of local languages will also help to ameliorate most of the difficulties while teaching the students. The use of foreign pictures should be reduced to the barest minimum. Frequent repetition of responses in the class should be adopted by the teachers as it is one of the psychological principles of learning.
- vi. Specialist teachers in Basic Science should be recruited as against the current use of generalists or single subject specialist-biology, chemistry and physics. In extreme cases, team teaching should be adopted.

### **Suggestion for further studies**

The researcher suggest that the following topics should be studied by other researchers in this filled of study.

1. Factors which cause the difficulties experience in the teaching and learning of basic science.
2. These effects of the qualification of teachers on the topics found difficult in the basic science syllabus.
3. Relationship between male and female students perception of difficulties in basic science.
4. The interest of students in the learning of Basic Science.

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