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Students' Common Difficulties in Manipulating Microscope Selected Schools in Kano State, Nigeria

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Abstract

This work was conducted to find out the students' common difficulties in manipulating microscope. Questionnaires were used for relevant and required data collections. The data collected were processed and analyzed using simple percentage. The findings were discussed and recommendations were provided for the benefit of research students and teachers. The objectives of this work are to reveal some common difficulties on manipulating microscope, their causes and finally suggest solutions to check these difficulties or to overcome them. This work was carried out with 50 students in level 100 from biology department. Tables 4-11 show the summary of the responses of these students on the questions asked about microscope while Tables 1-3 summarize the personal data of these students.

Keywords

Compound Microscope, Electron Microscope, Respondents, Sampling Techniques

1. Introduction

The microscope is generally used to enlarge object very much so that the minute internal structure can be seen. Small object can be examined; whole but thick objects must be cut into thin slices or section in order to see the internal structure; the whole picture must be built up from these section which can be better if the materials are placed in a drop of water or glycerin on the glass slide; fresh biological material is usually examined under low

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power in a few drop of water. Such preparations are of course only temporary, as the water soon dried up. Permanent preparation is made by techniques using special mounting media which are transference and remain unchanged. Microscope is mainly of two types: compound and electron microscopes.

Compound microscope: with very few exceptions cells are so tiny that none of them can be seen without the aid of a microscope. It is truly amazing that any knowledge of cell, or microscope organism was discovered before the invention of the modern compound microscope. Yet only a few years after Hooke's original observation, Dutchman Anthony van Leeuwenhoek, using a primitive handmade microscope, was describing a wide variety of microscopic organisms. He called them animalcules. But from his drawing we can recognize protozoa, various flagellates and some bacteria.

Electron microscope: the development of the electron microscope is one of the major achievements of applied physics in the twentieth century, and has revolutionized our knowledge of biology. It was based on the discovery that an electromagnetic filed acts on a beam of electrons in a way analogous to the action of a glass lens on a beam of photons. An electron beam has the properties of an electromagnetic wave of very short wavelength, when accelerating through an electric field its wavelength is universally proportional to the square root of the accelerating voltage. A wavelength of only 0.04 mm about 10,000 times shorter than that of visible light is routinely obtainable with accelerating voltage of about 100 kV. The resolving limit of the electron microscope is consequently several orders of magnitude lower than that of the high microscope and it thus permits the use of higher effective magnifications.

2. Maintenance of the Microscope

In the schools situation it is often convenient to purchase a number of microscopes from the same manufacturer. Servicing can then carried out on a regular basis by one of the makers service engineers.

1) Repairs should not be undertaken by anyone other than a skilled person as this can often cause additional damages to the microscope.

2) When not in use all microscopes should bestowed in the cases designed for them and in a dusted and fume-free atmosphere. Microscope cup boards should not sited near chalk boards as the dust can easily cause damage to the instruments. For short-term storage the microscope may be enclosed in a polythene.

3) The eye piece should always be left in position in the lens of one of the objectives.

4) All lenses and mirrors should be cleaned camel hair brush. Hand-kerchief or duster must never be used to clean lenses as they will almost certainly scrunch the surface of the lens. Once used a piece of lens tissue should be discarded (lens tissue is available from scientific suppliers and also from photographic dealers). If an objective becomes greasy or dirty with Canada balsam it should be gently wiped with a clean lens tissue barely dampened with a xylem tissue. Excess xylem will dissolve the lens cement. Alcohol must never be used for cleaning in the same way as the objectives and eyepieces.

5) Keep the stage clean by wiping with a piece linen always ensure that slides are firmly held by the stage clips.

6) Do not exchange eyepiece between microscope of different design and make and never exchange objectives always ensure that objectives are fully screwed into the nose pieces and that eyepiece are properly seated in the draw tube.

7) Always provide adequate support for the instrument it is being carried from one place to another and never used if on a surface which is not stable and horizontal.

8) After use ensure that the low power objective is left in the optical axis of the instrument and that there is not slide on the stage. Never carry the instrument with a slide in position on the stage.

This work is aimed at revealing students' common difficulties in manipulating microscope, their causes and remedies to overcome these challenges, these achieving greater heights sciences.

3. Materials and Methods

3.1. Introduction

The purpose of the study was to find out students' common difficulties in manipulating microscope. The term population is the total number of school. Therefore, the population includes the students.

3.2. Sampling Technique

Sampling technique is defined as a limited number of elements selected from the population in which is the repetitive of the population. The samples of this research work were selected among the N.C.E 100 level students from biology and integrated science department, and 50 Students were used in responding to the questionnaire.

3.3. Method of Data Collection

For the purpose of this work, the method used for data collection was structured type of questionnaire.

These were used because it can be filled out based upon the respondents interpretation without the researcher's personality and when questionnaire is used information may be gained easily. As a result fifty (50) questionnaires were used in the research (Meaning 50 students in level 100 biology).

3.4. Administration of the Questionnaire

The permission of the head of department, biology students were solicited to fill in the questionnaires and returned to the researcher respondents were assured full confidentiality.

The student's questionnaires given out were retrieved. Therefore survival rate was 100% and mortality rate was zero (0%).

3.5. Validation of the Questionnaire

The questionnaires were designed by the researcher and validated by the head of the department and supervisor.

3.6. Instrument Design

The instrument used for the data collection in this research work is questionnaire, the questionnaire is designed and divided into two (2) sections:

Sections A and B.

Questionnaire A is personal data and Section B is student's respondents.

3.7. Result and Discussion

The data obtained from the field of investigation will be presented and analyzed. The data are presented in tabular form through the use of questionnaire, interview and analyzed using simple deceptive statistics.

3.8. Data Analysis

Going to the data analysis the questionnaire constituted of two parts of the personal information of the respondents and the information about the work. The produced 50 copies of the questionnaires were returned, were used in the data analysis.

Part A

From **Table 1**, the responses show that 60% of the respondents were males and 40% of the respondents were female. Therefore the participation of the male is higher than of female.

From **Table 2**, it shows that age percentage of 15 - 20 is 20 and 20 - 25 is 40 and 25 - 30 is 18, 30 - 35 is 12 while 35 and above is 10. This means that majority are 20 - 25 years.

Table 3 indicates that single people involve their self in manipulating microscope than married and divorced people. It shows that 60% (single) 30% (married) and 10% divorced.

Part B

This part concerned with the project topics questions were asked based on the research topic.

It can be seen from **Table 4** that, the majority of the respondents 80% supported that microscope is one of the equipments use in the laboratory while only 20% respondent oppose the motion.

Table 5 shows that 90% agrees that compound microscope and electron microscope are the two types of microscope. While 10% disagrees that compound microscope and electron microscopes are the two type of microscope.

Table 6 shows that all the respondents responded that microscope got damage when not maintained.

Table 1. Sex distribution of respondent.

Sex	Frequency	Percentage (%)
Male	30	60%
Female	20	40%
Total	50	100%

Table 2. Age of the respondents.

Responses	Frequency	Percentage (%)
15 - 20	10	20%
20 - 25	20	40%
25 - 30	9	18%
30 - 35	6	10%
35 - above	5	10%
Total	50	100%

Table 3. The marital status of the respondents.

Responses	Frequency	Percentage (%)
Single	30	60%
Married	15	80%
Divorced	5	10%
Total	50	100%

Table 4. Microscope is generally used for enlarge objects very much so that the minute internal can be seen.

Responses	Frequency	Percentage (%)
Yes	40	80%
No	10	20%
Total	50	100%

Table 5. Lack of microscope in the laboratory affect students in manipulating the microscope.

Responses	Frequency	Percentage (%)
Yes	45	90%
No	5	10%
Total	50	100%

It can be seen from **Table 7** that 94% of the respondents responded that microscope while 3% responded that microscope is not equipment used in scientific research.

Table 8 expressed that 76% of the respondent agree that mirror is use for reflection of light while 24 percent do not agree.

Table 9 shows that 84 percent of the respondent responded that microscope cannot be repaired by any other person except the manufacturer while 16 percent are the opponents of the proposition.

Table 10 shows that 68 percent of the respondent are on the opinion that the dust causes damage to the microscope while 32 percent where on the opinion that do not cause damage to the microscope.

Table 6. Microscope got damage when not maintained.

Responses	Frequency	Percentage (%)
Yes	50	100%
No	-	-
Total	50	100%

Table 7. Microscope is equipment used in scientific research.

Responses	Frequency	Percentage (%)
Yes	47	94%
No	3	6%
Total	50	100%

Table 8. Mirror is used for reflection of light.

Responses	Frequency	Percentage (%)
Yes	38	76%
No	12	24%
Total	50	100%

Table 9. Microscope cannot repaired by any other person except the manufacture.

Responses	Frequency	Percentage (%)
Yes	42	84%
No	8	16%
Total	50	100%

Table 10. Does dust causes damage to the microscope?

Responses	Frequency	Percentage (%)
Yes	34	68%
No	16	32%
Total	50	100%

Table 11 indicates that 98 percent of the respondents supported the motion that lack of interest in the student causes difficulties in manipulating microscope.

Lack of enough microscope in the laboratory: This creates some difficulties among the students when manipulating the microscope, like in the case of viewing a specimen, some would be ushing to view a specimen while some would stay aside and some will even not participate in the practical due to lack of it (Mohammad, 1994).

Focus down wards to find the specimen: This is another difficulty found among the students when manipulating the microscope instead of them to view through the eye pieces they now try to focus it downwards which later on lead them into confusion and not finding the real observation (Stone, 1994).

Lack of interest among the students: This also affect student when using the microscope. Because interest has to be there in order to motive them and make them put there total attention during performing the practical.

Touch any lens surface when adjusting eyepieces or objectives. Some students found themselves in touching any lens surface when adjusting eyepiece or object which as a result of doing so make them not be able to mount

Table 11. Does the lack of interest in the student causes difficulties in manipulating microscopes.

Responses	Frequency	Percentage (%)
Yes	49	98%
No	1	2%
Total	50	100%

the specimen clearly. Many of the students try to search a specimen when it is under the higher power objective and at the end of it the image formation of the specimen would be hardly seen clearly.

Grip it by the stage or the tube: Some students during manipulating the microscope they grip the specimen by the stage or the tube which make it hardly to see clearly or to view the specimen clearly.

Poor communication skills: Research findings, Adejuga (1983) have identified poor communication skills as a major cause of student difficulties, he identified the following communication problems:

- In ability to present correct answer.
- Insufficient vocabulary.
- Non adherence to instruction.
- Wrong choice and inconsistence placement of slide on the microscope.

Other finding, Akinyola (1987) identified the fact that teacher, do not prepare students on how to answer question for this reason student loose marks where they should not of particular interest in students inability to draw biological diagrams with correct labels (Balogun 1982).

Try to fix a microscope which is not working correctly. Among the students some of them know that the microscope was not working correctly, but they would try to fix it in order to observe the specimen which at the end it would lead them into getting wrong image formation.

Gender difference in performance: Research finding Aminu (1982) have shown that boys perform better in attitude and better cognitive skills attainment than girls, tend to display an attitude of slyness and apathy, more especially during practical lessons. This is bound to affect their performance in the subject (Archohold, 1977).

Allow the stage surface or the lower surface of the slide to get wet. Among the student many of them do that and as a result of that image formation will not clearly seen.

Focus only on one place of the specimen. Some of the students use to do that and where they later on result in getting half formation of the image.

Place it in uncomfortable working position. Some students keep microscope where there is no enough light and balance for them to be able to manipulate the microscope. As a result of this it now bring some problems to them (Moses, 1983).

4. Conclusion

This work insists finding out students' common difficulties in manipulating microscope during the practical class. These are the examples of such questions below:

- To what extend does the lack of microscope affect the student?
- Do the students have good attitude toward using the microscope?
- Does lack of maintenance cause damage and make it difficult to use?
- Does lack of interest in the students affect them?

In an attempt to answer these questions questionnaires were designed and validate to the student's earlier state in the work that there are student common difficulties in manipulating microscope which are as the result of lack of enough or availability of microscope and maintenance of the equipment.

5. Recommendations

In view of the findings the following recommendation has been made:

- There is need for availability of microscope in the school laboratory.
- There is need to allow each student to participate fully in using the microscope.
- Students should have an interest when using the microscope in the laboratory.
- Recruitment of qualified teachers/staff that has experience in microscope is the best way of improving stu-

dents in suing the microscope.

- The teacher should use the method that would motivate the students in using the microscope effectively.
- Good arrangement should be made by school to improve student's skills in using microscope.

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