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Methods used by Senior High School Teachers to teach Specimen Identification, Drawing, and Labeling in Biology

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ABSTRACT

The successes of students in biology in the West African Secondary School Certificate Examinations over the years have been very discouraging. Studies have specified that this is partly due to the poor knowledge of students in biological drawings, labeling and identification of specimen. Indications in the literature revealed that biological drawings, labeling and identification could be used to facilitate students' learning. This study, therefore, evaluated the methods used by teacher to teach biological drawings, labeling and identification in Senior High Schools. Action research method was employed. The study population comprised all Biology students at Winneba Senior High School. A sample of 35 Biology students were used for the study. The instruments used were questionnaire, and interview. Three research questions were answered. Findings of the study showed that: students possessed poor knowledge of biological drawings, labeling and identification and this could be due to the poor teaching method used by teachers. The study concluded that Students' drawing, labeling and identification skills could be improved if teachers change their methods of teaching and introduce new methods like the use of computer assisted instructions. It was recommended that teachers should make themselves available to new technologies such as Computer- Assisted Instruction and other computer software in other to be abreast with time.

INTRODUCTION

Biology is a science in which the curriculum continuously changes (Barrow, 2006). New knowledge and emerging content have an enormous impact on our lives. Biology is therefore a subject filled with interesting phenomena, appealing experimental activities, and fruitful knowledge for understanding the natural and industrial world. Interestingly, aspects of the subject entail the identification of specimen, drawing of various specimen such as insects, plants and other living organisms and labeling them correctly.

Correct identification of specimens, drawings, and labeling in biology are very important aspects of the subject that cannot be overemphasized. They are the aspects in which success is a matter of following the rules. Learning to identify specimen correctly, drawing and labeling in biological science can be compared with learning to play the piano. Certain rules must be observed. Breaking the rules will not lead to good illustrations or artistry work. Aspiring pianists who attempts to depart from the fundamental rules before learning the basic harmony will not succeed in becoming an artist or a good pianist. Just so, the biological illustrator who wishes to identify, draw and label without learning or observing the rules of drawing will experience undue difficulties in trying to achieve a satisfactory illustration and will lose much time in making corrections.

Most biology students however, perceive the identification of specimens, drawing and labeling aspect of the subject to be very difficult (Barrow, 2006). It is therefore, important to appreciate the various areas of difficulties as expressed by students. The biological drawing, identification and labeling aspect of the subject are by themselves very practical, concrete and complex. Areas such as mammalian anatomy and physiology, life processes of living things, structure and life processes of some organisms and cell biology are some of the areas where specimen identification, drawings and correct labeling are needed to facilitate easy understanding and so while much can be acquired by rote learning (this often being reflected by efficient recall during examinations), real understanding and perfect identification of specimen, drawing and labeling demand the conceptual understanding of the various associated processes.

According to Barrow (2006), students face difficulties in understanding concepts in biological specimen identification, drawing, and labeling because some teachers are not able to connect students' prior knowledge in the classroom. Since the initiation of the Senior High School programme in Ghana, biology has always been studied as an elective Science subject. In the 1987 Education Reform programme, it was indicated that Senior High Schools were established to replace the British-based O-level and A-level system. In 1999, subject combinations were greatly liberalized permitting combinations that had previously been impossible.

Statement of the Problem

Several studies have shown that high school students perceive science knowledge as either right or wrong

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(Bernama, 2012). Unfortunately, biology concepts are rarely this clear-cut and the body of knowledge in biology is ever changing. Biological systems are dynamic, and long-term observations are often needed to understand and make sense of the evidence, making learning of the subject difficult for most students. Accurate identification of specimen, good drawing and labeling are those that abridge, highlight, review and explain most biological concepts. For these explanations, consideration to the smallest feature is precisely significant. Biological drawings are not destined to be artistic masterpieces but are more like graphic notes that help record a set of observations.

As such, these observations must be accomplished in class with the specimen directly observable and they are supposed to be accurate and based on real living things or fossils. The idea behind a biological drawing, labeling and identification of specimen is to communicate what is seen, and the extent to which this is accomplished determines the usefulness of the illustration. The primary requirement for any artist, and especially for the science artist, is a well-developed power of observation.

The 2015 Chief Examiner's report of West African Examination Council (WAEC, 2015) indicated that biology students have difficulty in learning biology. This has reflected in the low grades obtained by students during the end of term examinations in most schools in the country. Some of the weaknesses outlined by the chief examiner report over the years (1994-2017) are as follows:

i. Candidates' answer show that they had not been taken through adequate practical lessons.

ii. Students' answers indicate that they had not done any practical work along the lines of test items.

iii. Candidates' wrote unobservable features. Thus, they answered practical questions from the theory they had learnt.

iv. The standard of drawing and labeling that students presented were poor. This indicated that they did not practice biological drawing and labeling as required by the practical examination.

Also, students find it difficult to spell biological terms, draw structures of organisms under study and label them correctly, use the simple light microscope, perform simple practical experiments, and solve simple graphical problems (WAEC, 2015). These were comments from the 2015 Biology chief examiner.

This problem has led to many students failing in biology which could have been avoided if certain issues have been corrected. Considering the evidence outlined above on student's difficulties in biology, it is clear to note that some biology students in the Senior High Schools find it difficult to grasp simple biological concepts such as how to identify simple biological specimen, make simple biological drawings and label the correctly which results in failure in examinations.

This is a gap that must be filled. This study therefore sought to fill this gap by investigating the causes of students' difficulties in identifying simple biological specimen, making biological drawings and labeling them correctly in the selected senior high school and fill the gap by making important recommendations that will help solve this problem.

Objectives of the Study

The main objective of the study is to examine the methods teachers use to teach identification of specimen, drawing and labeling in biology.

The specific objectives are

1.To asses the methods used by teachers in teaching specimen identification, drawing and labeling.

2.To examine the effects of bad teaching methods on students' performance.

3.To make recommendations on how to improve the teaching methods used in teaching specimen identification, drawing and labeling.

Research questions

1.What are the methods used by teachers in teaching specimen identification, drawing and labeling?

2.What are the effects of bad teaching methods on students' performance?

3.What recommendations can be made on how to improve the teaching methods used in teaching specimen identification, drawing and labeling.

MATERIALS AND METHODS

Research Approaches and Design

The study adopted the Action research design and the mixed method approach to data collection. For Creswell (2007), exploratory research is the initial research into a hypothetical or theoretical idea. This is where a researcher has an idea or has observed something and seeks to understand more about it. An action research project is an attempt to lay the groundwork that will lead to future studies, or to determine if what is being observed might be improved by an intervention. Most often, action research lays the initial groundwork for future research.

Both quantitative and qualitative research methods were adopted to address the problem. Quantitatively, students' marks obtained in both the pre-test and post-test were recorded over ten. Students were given codes from W1 to W35 to secure their identity.

According to Creswell (2007), using both quantitative and qualitative designs allow the researcher to explore a complex social or human problem, builds a complex holistic picture, analyses words, reports detailed views of informants and conducts the study in a natural setting.

Population

Population is any set of people or events from which the sample is selected and to which the study results will be generalized Anastas (1999). In this study, the population was all biology students in Winneba Senior High School in Winneba. The school has six science classes in which

all of them study biology as a course. This made a total population of 449.

Sample Size and Distribution

After purposively selecting three (one from each form) based on the fact that these are the students offering elective biology, thirty-five (35) respondents made up of 17 SHS 3, 12 SHS 2 and 6 SHS 1 students were randomly selected from the three classes for the study.

The justification of the sample size lies in the fact that time and resources available to the researcher were not enough to cover the entire 449 students. Also, working with a small sample made the supervision and guidance provided during the intervention easier and more effective.

Sampling Techniques

The method of sampling was a combination of purposive and systematic random sampling. The reason for purposive sampling was that there are some classes that do not offer elective biology; such classes were not included.

Systematic random sampling technique was used to select the students for the study. The first student seated on the right row in each of the biology class was selected and thereafter, every third student was selected until the number allotted to the class is obtained.

Research Instruments

Yin (2003) outlines four main techniques for data collection, three of them were adopted in this study. They are: Questionnaire, Interviews and Observation.

Questionnaire

A questionnaire was the major instrument used in collecting information for this study. The study made use of one structured questionnaire. The questionnaire was for all respondents who constitute the principal target group for the study. The questionnaire consisted mainly of closed-ended questions. The purpose of the questionnaire was to find out the perception of the respondents on biological drawing, labeling and identification. Majority of the questions were pre-coded with multiple-choice responses. Few other questions were open-ended seeking respondents to provide the specific response.

Observation

In addition to the questionnaire, participants were observed to clarify and ascertain the truth or otherwise of issues respondents had raised. This method was appropriate because, a lot of issues relating to biological drawing and identification was identified while the students were engaged in practical work. An observational check list (Appendix II) was designed to help the researcher.

Worthy of note was the issue of the type of pencils that were used for the drawings, the type of paper they used and how independent the participants were during the practical lesson. Inspections were also conducted on previous drawings of students in their work book. This provided the researcher with first-hand information on issues related to the study and in-depth qualitative data was generated by the use of this technique.

In-depth Interview

Semi-structured in-depth interviews were conducted with the sampled biology students. These interviews were undertaken to identify the problems biology students face in identification, biological drawing and labeling. An interview guide (Appendix III) was designed to guide the researcher. The in-depth interview was also appropriate for interviewing students with busy schedules. It generated depth of information regarding opinions about the study. The interviews were held on 6thFebruary, 2019 and 15th February, 2019.

LITERATURE REVIEW

Conceptual framework

Traditionally, students struggle to learn some of the basic ideas taught in high school biology classes (Barrow, 2006). To understand why, we must analyze not only the content itself but also the classroom conditions and learning environment. One concern cited by biology teachers is the "overstuffed" Biology curriculum. Because of the sheer amount of information that is taught related to each topic, even good students find it difficult to retain what they learn (Bernama, 2012; Tawiah, Fiergbor, & Hughes-Lartey, 2025). Because of an emphasis on a fact-based biology curriculum, instruction often relies on direct instruction to cover all of the material. As a result, students have limited practical experiences and therefore find it more difficult to practice more drawing, labeling and specimen identification in Biology and they hardly ever retain what they learned, pass the quiz or unit test. Certain Biology topics involve more practical, experiments, investigations and drawings which are hard for students to learn because students aren't given the time they need to think, practice, draw and process learning.

We must give students multiple opportunities to engage with ideas, manipulate and practice what they learn. Research suggests that students need at least four to six experiences in different contexts with a concept before they can integrate the concept and make sense of what they are learning (Bialek & Botstein, 2004). Another reason is that there are hard to teach (and learn) topics that relates to the prior knowledge of our students.

High school students are far from being blank slates; they come to us with their own ideas and explanations about biology principles (DeHaan, 2009). After all, everyone knows something about biology and our students have had a variety of experiences both as they have grown up outside school and in previous science classrooms. Student preconceptions can be incomplete and students often hold onto them persistently. One classic research study was captured in the video 'A Private Universe:

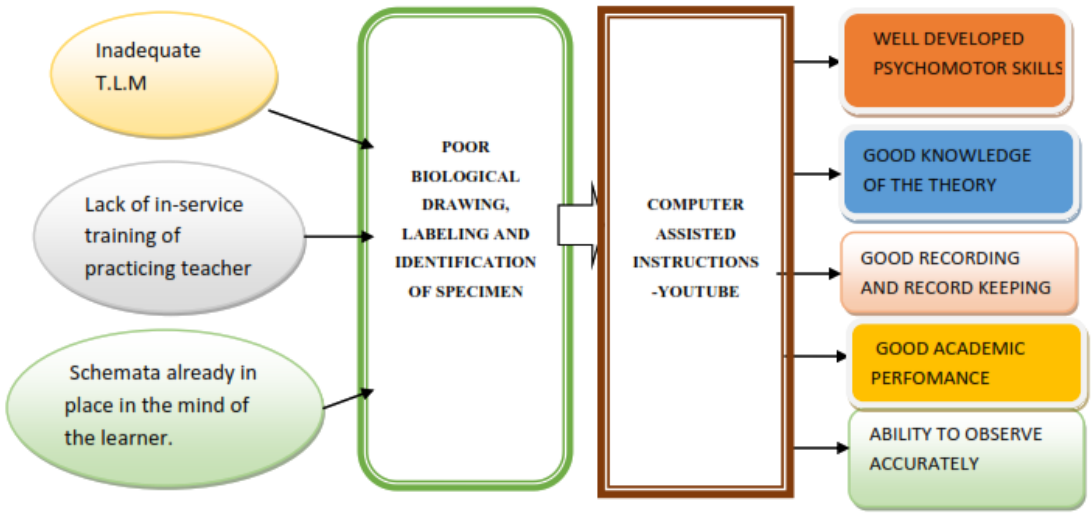

Figure 1: Conceptual framework of poor biological drawing

Minds of Our Own' (Chiel, McManus & Shaw, 2010). In one segment, researchers asked Harvard graduates where the mass of a log came from. The response was water and nutrients from the soil. Students and even college graduates hadn't learned the fundamental concept that photosynthesis requires carbon dioxide from the air to manufacture carbohydrates, which are the basis for the vast majority of a tree's mass. This example relates to two additional reasons why some biology topics are hard to teach.

One, many biology practical lessons are highly conceptual and students can't visualize what is taking place on a microscopic level. And two, some biology teachers are not aware of strategies that engage students with a scientific way of knowing (Bialek & Botstein, 2004). Such strategies to manage this include asking questions, inferring from data, challenging each other's ideas, communicating and inquiry results, synthesizing student explanations with scientific explanations and finally making illustrations, diagrams and drawings of what they have learnt. When we consider these various impeding factors, it is no wonder that students struggle in our biology practical lessons.

Theories Underpinning the Research

In order to construct an ideal-typical model on specimen identification, drawing and labeling in biology the Kolb's Learning Cycle Theory and the Constructivist Learning Theory (CLT), guided the study. Two of the most revered scholars/pieces of scholarship in the discipline of learning and education.

Kolb's Learning Cycle Theory

This study is underpinned by Kolb's Learning Cycle Theory. Kolb's learning cycle theory (1976) describes the stages of learning as knowledge, experience and skills are acquired. This perspective of learning is called 'experiential learning' or 'learning by doing' and relates to constructivist learning. The cycle can begin from any one of the four stages (feeling, watching, thinking or doing,) and link to any other stage.

1. Watching (reflective observation)
2. Thinking (abstract conceptualization)
3. Doing (active experimentation)
4. Feeling (concrete experience)

In Kolb's learning cycle (Kolb, 1976 and 1984), four stages (or modes) of learning are identified. Learners are involved in new experiences (also known as concrete

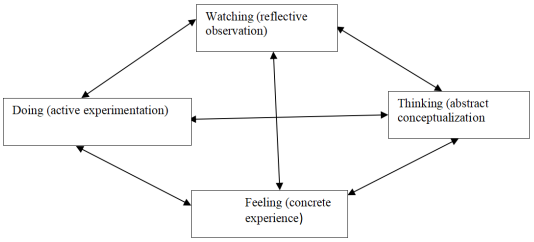

Figure 2: Kolb's Learning Cycle Theory

experience). Again, learners must make or have time and space to be able to reflect on their experiences from different perspectives (also known as reflective observation), Learners must be able to form, re-form and process their ideas, take ownership of them and integrate their new ideas into sound, logical theories (also known as abstract conceptualization). Learners need to use understanding to make decisions, solve problems and test implications in new situations (also known as active experimentation). These activities generate material for the starting point of the next round, concrete experience Learners tend to differ in their tendencies and preferences to learning due to personality, cognitive processes and prior learning experiences.

This theory (Kolb, 1976) is perfectly linked to the present study in that for every student to make good specimen identification and biological drawing him or she has to watch the object or specimen to be identified and

drawn critically, think about it before the identifications and drawings are made. A good drawing will lead to a concrete experience.

The Constructivist Learning Theory (CLT).

The Constructivist Learning Theory (CLT) will also guide this study. The theory is highly developed by Lev Vygotsky, a Russian psychologist (1896-1934) who also came up with Social Development Theory (SDT) which is applied in education (Bruner, 1996). Constructivism is an active procedure whereby teacher guide the learners to create their own new information from previous knowledge during learning. The constructed knowledge in this study is procedure, observation, execution and interpretation skills used in selected tasks that constitute the independent variables while achievement or performance in the skills tested constitutes the dependent variable. This type of learning proposed by Vygotsky is a give-and-take experience for the teacher and the students. It places emphasize on the affective domain, makes instruction significant to the learner, it also help learners build up beliefs and attitudes that support both present and lifetime learning, and balance teacher-control with personal self-sufficiency in the education environment (Hoese & Casem, 2007).

According to this theory, student constructs their own knowledge from personal experiences, textbook, the teacher explanation or any other means of knowing. In attempting to solve problems on novels, there is perceptual or conceptual similarities between knowledge of a new problem and can remind people of what they already know and the knowledge will be impacted on the learning process. Information not connected with a learner's previous experiences is rapidly forgotten. In short, the learner must actively enrich the existing information by constructing new additional knowledge for meaningful learning to occur. This is due to the fact that constructivism views learning as a process in which the student actively constructs or builds new ideas or concepts based upon current or past knowledge (Jones, Reeds and Weyers, 2003).

The concept of Specimen identification, biological drawing and labeling

Specimen identification, drawing and labeling constitute the practical work in senior high school biology. Practical work simply involves the scientific instruction which results in learning activities in science. Student-centered method of doing school work is one of the methods but the flagship for learning in science is laboratory work and by extension Biology (Singer & Hilton, 2005; Lowman, 1995). Woolnough (1994) stressed that in the laboratory, the assessment of students' behaviors should consist of planning and designing, implementing, analyzing and interpretation of data and application of laboratory techniques to new problems. According to the Macmillan Dictionary (2007), practical is defined as an examination or lesson in which a student makes things or does experiments. Therefore, the term practical refers to what pertains to practice or action, which is "doing". The "doing" aspect will depend on the acquisition of the required skills. Skill can therefore be defined as the capability in doing something. The two terms, practical and skills go hand in hand for the effective learning of specimen identification, drawing and labeling in biology as spelt out in the Biology syllabus.

Practical skills in biology which mainly include the identification of specimen, drawing and labeling are tested completely in the practical paper of all external examinations; however, practical findings may also be tested in a theory paper. Improving the level of competence in student's specimen identification, drawing and labeling skills may determine performances in a class and eventually at the national or a higher level. Going through the materials needed for specimen identification, drawing and labeling, for example those necessary for viewing microscopic organisms, testing for types of food drawing and labeling and doing the specific practical using the provided materials is expected of a student (Roberts, 2004; Kathyole, Dinama, & Kahaka, 2024).

Identification in biology is the process of assigning a pre-existing taxon name to an individual organism. Identification of organisms to individual scientific names (or codes) may be based on individualistic natural body features, experimentally created individual markers (e.g., color dot patterns), or natural individualistic molecular markers which is similar to those used in maternity or paternity identification tests (Waldchen, & Mader 2017). Individual identification is used in ecology, wildlife management and conservation biology. The more common form of identification is the identification of organisms to common names (e. g., "lion") or scientific name (e. g.,

"Panthera leo"). By necessity this is based on inherited features or "characters" of the sexual organisms, the inheritance forming the basis of defining a class. The features may, e. g., be morphological, anatomical, physiological, behavioral, or molecular. (Osborne & Freyberg 1985).

Occasionally, the term "determination" may be used as a synonym for identification, or as in "determination slips". Identification methods may be manual or computerized and may involve using identification keys, browsing through fields guide that contain (often illustrated) species accounts, comparing the organism with specimens from natural history collections, or taking images to be analyzed and compared against a pre-trained knowledge base with species information (Wäldchen, *et al* 2017).

The role of practical work in the teaching and learning of Biology

The argument developed in the previous section, in particular, the view that much of the scientific knowledge we want to teach in biology is consensually agreed and beyond reasonable dispute, might be read as implying a

'transmission' view of teaching and learning – that the aim is to 'transfer' the knowledge initially in the teacher's mind into those of the students (Millar 2004).

Where the teaching of abstract ideas is involved, transmission simply does not work. The learner must play an active role in 'taking on' the new knowledge. He or she has to 'make sense' of the experiences and discourse of the science class and use it to 'construct meaning'. In this essentially constructivist view of learning, however, the knowledge that we want the students to construct is already known to the teacher throughout. The teaching laboratory is therefore very different from the research laboratory, as Newman (1982) points out:

The young child is often thought of as a little scientist exploring the world and discovering the principles of its operation. We often forget that while the scientist is working on the border of human knowledge and is finding out things that nobody yet knows, the child is finding out precisely what everybody already knows. (p. 26)

Accurate biological drawing

The ability to draw, label and annotate biological specimens is an important and useful biological skill. Drawing is a very important skill in biology because it is considered a type of data collection because drawings help to record data from specimens. Drawings can highlight the important features of a specimen. A drawing is the result of a long period of observation at different depths of focus and at different magnifications.

These days' students may well challenge the need for making biological drawings, particularly given the ease of using digital photography for record-keeping. So how can it be justified? The following points help to provide a rationale for developing biological drawing skills: Accurate observation and attention to detail is encouraged (Hoese & Casem, 2007). Having to draw a biological specimen not only increases the amount of time spent examining the specimen, which in itself will aid learning, but requires a much greater level of accurate observation than a casual examination. Active recording aids memory. The educational philosophy behind this is neatly summarized in the well-known Chinese proverb: I hear and I forget I see and I remember I do and I understand.

The drawing provides a permanent record of what has been observed. There is a historic tradition within biology of providing accurate records of specimens so that the images could be used for future reference purposes. Today's taxonomists could be used for future reference purposes. Today's taxonomists are often indebted to the illustrators of the 17th and 18th centuries, particularly where the 'type' (reference) specimen may only exist as an illustration.

Even today, when digital photography can be used to store images, artists are still often commissioned to record biological specimens of interest by drawing or painting (Hoese & Casem, 2007). This is particularly true for flowering plants. This is partly because all the features of interest can be combined in one or several scientifically accurate but aesthetic images with great clarity.

Causes of poor specimen identification, biological drawings and labeling among biology students

Students encounter difficulties in learning good specimen identification, drawing and labeling skills in biology. The ability to identify biological specimen, make accurate drawings of specimens and label diagrams correctly like any other learning task requires patience and practice (Billiet, 2003). Interpretation and construction of images are core skills students must master in order to understand concepts in Biology and this is not an easy task. Hoese and Casem (2007) and Frith and Law (1995) say that to identify and make a drawing of an object one is looking at, he or she must first convert the information being received with the eyes into a new form that will control the muscles of the hands. The way this information is processed and transformed is best described in cognitive terms.

This is difficult to most learners, especially those with low cognitive level. They added that identification of specimen and drawing depends upon the combination of a number of simple and yet independent processes. What makes a good biological drawing is more complicated than simply its accuracy (Hoese & Casem, 2007). The hardest part of identification and drawing is not as many assume, controlling one's pencil, rather it is the act of observing with precision and consciousness of the specimen before the observer (Amelia, 2007). Amelia continues to say that many things hinder the act of observation, for example the schemata already in place in the mind of the learner. If the schemata are not in line with what is to be drawn, they have to be altered. The changing of the schemata may be difficult to some students. Another major problem at the present is that Biology textbooks approved by the Ministry of Education are passive on principles of specimen identification, biological drawings and labeling (Sandoval, 2003; Anning, Owusu-Addo, Peprah, & Konadu Snr, 2024).

RESULTS AND DISCUSSIONS

Class of Respondents

The respondents were at different levels in the Senior High School. Six (6) SHS 1 students, twelve (12) SHS 2 students and seventeen (17) SHS 3 participated in the survey. More students were selected from SHS 3 because they had experienced more years in the teaching and learning of biology and could readily tell the difference in the teaching methods used to teach the subject. Also, they were preparing to write their final examination, hence they needed more assistance. SHS 2 also had the next higher number because they also had few months to prepare for their final exams. Only few were selected from SHS 1 because they have more time ahead of them. This is shown in the table below:

Table 1: Academic level of Respondents

Class	Frequency (n)	Percentage (%)
SHS 1	6	17.1
SHS 2	12	34.3
SHS 3	17	48.6
Total	35	100

Analysis from Research questions

Methods of Teaching

Research question 1: What are the methods employed by teachers to teach identification of specimen, drawing and labeling in biology?

Methods used to teach specimen identification

Students were asked to specify the method that was used to teach them specimen identification in class. Out of the 35 students, 12.5% said lecture method was used to teach them the topic, 62.5% said activity method was used by their teacher to teach the topic, 6.25% said discussion method was used to teach the topic. Three (3) of the students representing 18.75% said they were not aware of the method the teacher employed in teaching the topic. None of them mentioned computer- assisted method as what was used to teach the topic. (Figure 4.1).

Methods used to teach Biological drawing

Students were asked to specify the method that was used

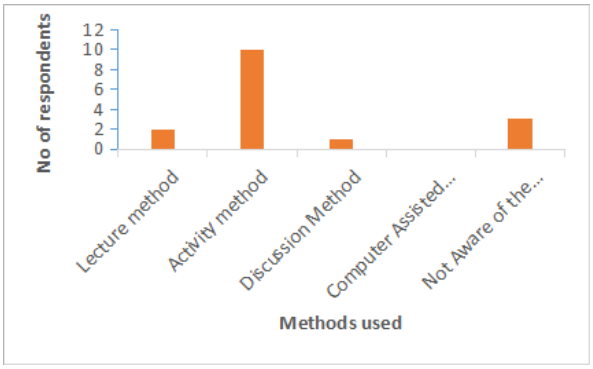

Figure 1: Methods used by teacher to teach specimen identification

to teach them biological drawing in class. Out of the 35 students, 11.8% said lecture method was used to teach them the topic, 70.6% said activity method was used by their teacher to teach the topic, 5.9 % said discussion method was used to teach the topic. Two (2) of the students representing 11.8% said they were not aware of the method the teacher employed in teaching the topic.

Methods used to teach Biological drawing

Students were asked to specify the method that was used to teach them biological drawing in class. Out of the 35 students, 11.8% said lecture method was used to teach them the topic, 70.6% said activity method was used by their teacher to teach the topic, 5.9 % said discussion method was used to teach the topic. Two (2) of the students representing 11.8% said they were not aware of the method the teacher employed in teaching the topic. None of them mentioned computer -assiSsted method as what was used to teach the topic. This is shown in the diagram below:

Methods used to teach Labeling in Biological drawing

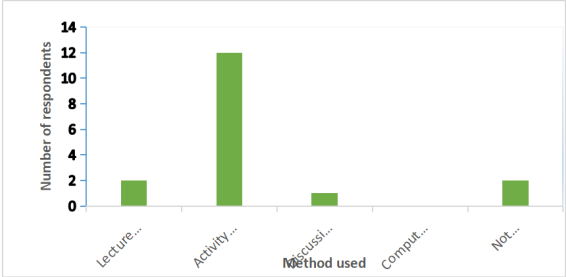

Figure 2: Methods used by teacher to teach biological drawing

Students were asked to specify the method that was uses to teach them biological drawing in class. Out of the 35 students who said they have been taught the topic, 19.0% said lecture method was used to teach them the topic, 71.4% said activity method was used by their teacher to teach the topic, 4.8 % said discussion method was used to teach the topic. One (1) of the students representing 4.8% said they were not aware of the method the teacher employed in teaching the topic. None of them mentioned computer assisted method as what was used to teach the topic. This is shown in Figure 4.3.

Method Used in Teaching Specimen Identification

A five Likert scale question was used to identify the

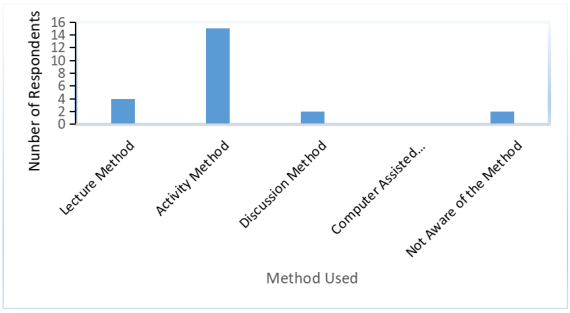

Figure 3: Methods used by teachers in teaching labeling in biology

methods employed by teachers to teach students identification of specimen. These were lecture method, activity method, discussion method, computer- assisted method and not aware of the method. In looking at the comparison of the percentages, a large majority of the students answered that their teachers use the activity method in teaching them specimen identification. In comparing the percentages of students who chose activity method versus discussion method, a large majority of

teachers at the senior high school level uses the activity method in teaching specimen identification. In comparing students who chose discussion method versus lecture method, majority of the students selected lecture method over discussion method. In comparing the three methods to computer- assisted instructions, it was realized that none of the student chose CAI. This implies that none of the teachers at the senior high school level uses CAI in teaching specimen identification. However, some few students were not aware of the method their teacher used in teaching them specimen identification.

Method Used in Teaching Biological Drawing

In analyzing this, five options were given to the students to choose from to help the researcher to detect the methods employed by teachers to teach students how to make biological drawings. These were lecture method, activity method, discussion method, computer assisted method and not aware of the method. In looking at the comparison of the percentages, a large majority of the students selected the activity method. In comparing the percentages of students who selected activity method versus discussion method, a large majority of teachers at the senior high school level use the activity method in teaching the students how to make accurate biological drawings. In comparing students who indicated discussion method versus lecture method, majority of the students selected lecture method over discussion method. In comparing the three methods to computer assisted instructions, it was realized that none of the student indicated CAI. This implies that none of the teachers at the senior high school level uses CAI in teaching how to make good biological drawings. Nevertheless, some few students were not aware of the method their teacher used in teaching them how to make biological drawings.

Method Used in Teaching How to Label Biological Drawings

Five options were given to the students to choose from to help the researcher identify the methods employed by teachers to teach students how to label biological drawings. These were lecture method, activity method, discussion method, computer -assisted method and not aware of the method. Comparing the percentages of the results, a large majority of the students answered that their teachers use the activity method in teaching them labeling in biology. In comparing the percentages of students who picked activity method versus discussion method, a large majority of teachers at the senior high school level uses the activity method in teaching labeling. In equating students who indicated discussion method versus lecture method, majority of the students selected lecture method over discussion method. In comparing the three methods to computer- assisted instructions, it was realized that none of the student selected CAI. This implies that none of the teachers at the senior high school level uses CAI in teaching labeling. But some few students were not aware of the method their teacher used in teaching them how to label biological drawing.

What are the effects of poor teaching methods on students' performance?

According to Buddha, the mind is everything. What you think you become' and therefore in accordance with this statement our mind is responsible for the actions we take. In this case poor teaching methods have highly affected our mind and our thinking making us feel that we are good at certain subject than the others and even making us go as far as hating the subject whereas all that is required is a different approach. Poor teaching methods affect student s understanding of what has been taught and also affect the attitude of students toward the understanding of several topics. The poor performance of students in end of term exam and final examinations can also be attributed to the use of poor teaching methods by teachers.

What recommendations can be made on how to improve the teaching methods used in teaching specimen identification, drawing and labeling?

Recommendations for Teachers

1.They should make themselves available to new technologies such as Computer- Assisted Instruction and other computer software in other to be abreast with time.
2.They should always be around to supervise students when they are using computers to learn because some students may do something else with the computer rather than learning.

Recommendations for Ghana Education Service

1. Experts in Computer- Assisted Instruction from Ghana should be selected and sent to countries where this mode of instruction is utilized. This will upgrade their knowledge and help them make meaningful impact when they return.
2. There should be an introduction of Computer- Assisted Instruction in the curriculum of Colleges of Education to enable teacher- trainees to prepare their own software to teach various subjects.

CONCLUSION

The results gathered from the study specify that most teachers in the senior high schools use the activity method in teaching them identification of specimen, drawing and labeling in biology. The other methods such as discussion method, and lecture methods were used by few teachers. No teacher at the senior high school ever use CAI in teaching identification of specimen, drawing and labeling in biology.

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