

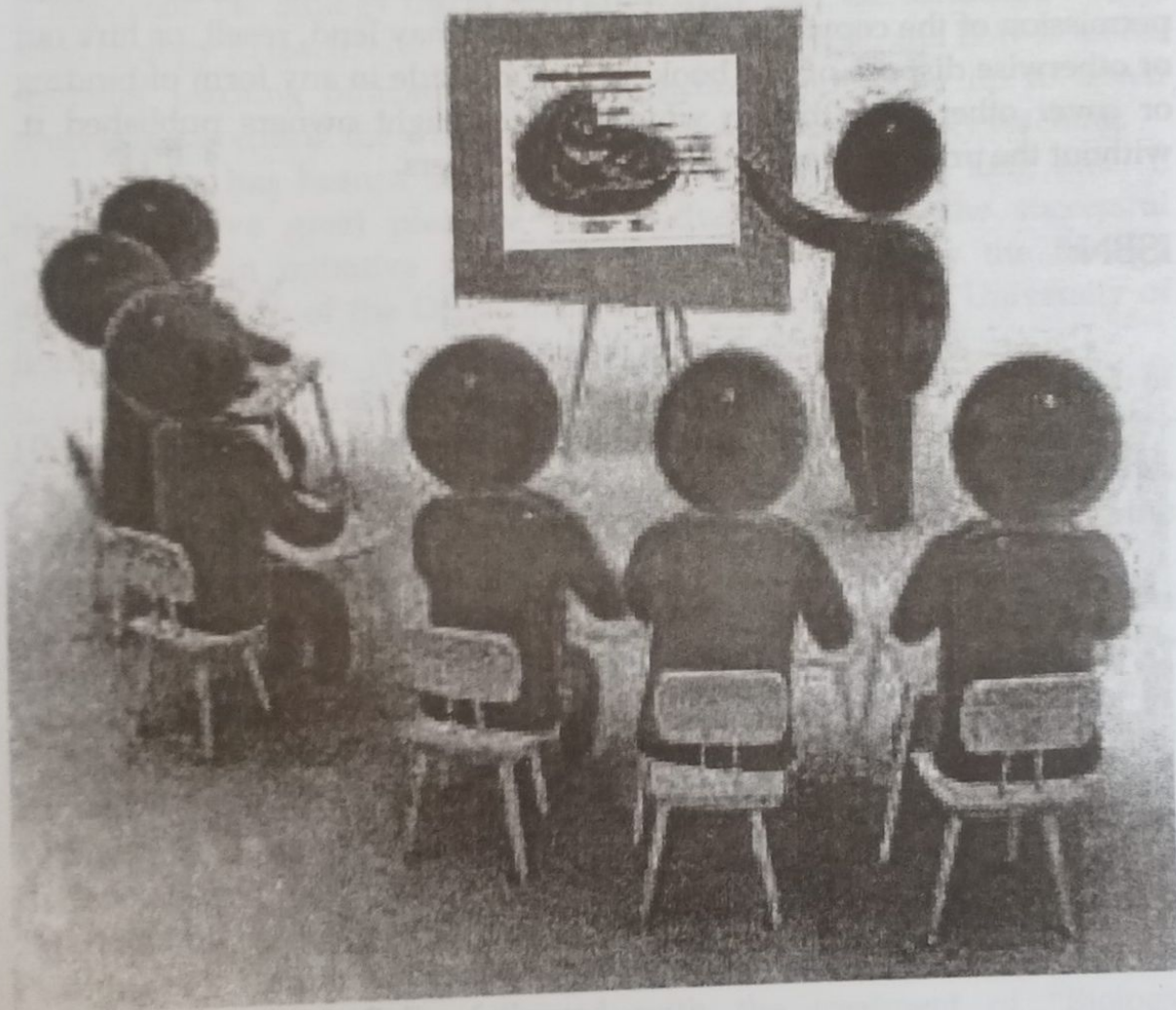
BIOLOGY TEACHING METHODS



Edited by

Isaac Olakanmi Abimbola

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CHAPTER 11

THE ROLE OF STUDY TECHNOLOGY IN BIOLOGY TEACHING

Aduke Rihanat Ahmed

Introduction

Study Technology is among the innovations in the methods of teaching and learning. This is why it was described as a new teaching and learning tool. It is based on certain basic principles and effective methods that can be used to teach and learn all subjects, and not only Biology.

L. Ron Hubbard, an educator and author, in the United States of America, first developed study Technology in 1972. The principles involved in Study Technology are currently in use worldwide, including developing countries like Nigeria. It was introduced to Nigeria in 2004 through a Basic Training Programme sponsored by the Education Trust Fund and delivered by Applied Scholastics International, McRae & Co. Applied Scholastics International is a non-governmental organization in the USA, which helped to develop Study Technology as teaching, and learning methods in a research based system of teaching and learning how to learn. (Slaughter, 2006).

Biology, one of the branches of science, is defined as a field of empirical science that examines the structures, functions, origin, growth, evolution and distribution of living things: both past and present, classifying and describing the various forms of organism and the interactions they have with each other and with their natural environment. (Wikipedia, 2016).

The aims of teaching biology at both secondary and higher education levels, according to the National Policy on Education (2013) include the following:

- a) To develop in the student, a skill in scientific thinking.
- b) To help students develop the science attitude which include:
 - i. Willingness to suspend judgment when evidence is lacking.
 - ii. Eagerness to seek out evidence on which opinion must rest.
 - iii. Readiness to alter one's views when new evidence demands it.

- iv. Respect for the view of others, however different they may be, provided they are on facts.
- c) To help students understand the facts, principles and theories of biology (as set out in the syllabus).
- d) To help students appreciate the relevance of biology studies to everyday life and to a better understanding of cognate science.

Applying Study Technology strategies for the teaching of biology will equally assist in achieving those aims. Hence, the attempt is made in this chapter to describe the role of Study Technology in the teaching of Biology and this shall be discussed under the following subheadings:

- i. Aims and Objectives of Study Technology
- ii. Nature and Prospects of Study Technology
- iii. Effectiveness of Study Technology and its Applications in the Teaching of Biology
- iv. Conclusion
- v. Revision Questions
- vi. References

Aims and Objectives of Study Technology

The introduction of Study Technology into Nigeria's higher education system could assist in achieving the following objectives, which are also directly related to the role of Study Technology in the teaching of biology.

Objectives

- 1 The knowledge of types of barriers to study;
- 2 Ability to identify mental and physiological reactions to barriers to study;
- 3 Knowledge of remedies to barriers to study;
- 4 Application of knowledge gained in improving teaching and learning;
- 5 Knowledge of effective communication skills for teachers and students
- 6 Drills in effective communication skills
- 7 Ability to handle student discipline problems; and
- 8 Awareness of the usefulness of Study Technology principles and strategies.

Prospects of Study Technology

Study Technology is like a "universal elixir" that is, capable of curing all the ills of educational institutions and the larger society.

1. Basic training in Study Technology needs to be provided for all University lecturers;
2. Deliberate use of good dictionaries, to reduce incidence of the misunderstood word and to aid learning;
3. Study Technology is useful in dealing with:
 - a. Students' learning difficulties--all students, including students on probation and spill-over students;
 - b. Staff and student disciplinary problems;
 - c. Staff and student unions;
 - d. "drop-out" syndrome;
 - e. Examination malpractice;
 - f. "Area Boys" syndrome;
 - g. Restive youths;
 - h. Cultism;
 - i. Ethnic crises;
 - j. Boundary disputes;
 - k. Religious crises;
 - l. Political crises and so forth.

In the application of Study Technology to the teaching of Biology, the teacher needs to know what constitutes "Barriers to study." He or She should be able to identify mental and physiological reactions to barriers to study, as well as the knowledge of remedies to such barriers. Thus, he or she will be able to apply the knowledge gained in improving the teaching of biology. Barriers to study are those things that block the way for the meaningful understanding of any topic, concept, principles, or laws in any subject. There are three major barriers to study, namely, Lack of mass, too steep a gradient (skipped gradient), and misunderstood word.

"Mass" is the actual physical object of the subject matter under treatment in a teaching-learning situation. Biology teachers are expected to provide their students with the "mass" they need during lessons. For instance, in teaching certain topics, the teachers should provide the students with real examples of things or objects to illustrate the topic for efficient teaching. When it is extremely difficult for the teacher to find the real or a physical object, the substitutes that could be used for such illustrations are pictures, movies, and demonstrations with demo kit, clay demonstration, and sketching. Using "Mass" for teaching Ecological

Instruments used for measuring Ecological factors, for instance, makes the teacher to bring such instruments to the class and demonstrate how they could be used for such measurements. In addition, in teaching certain topics, concepts, or principles such as Living things, genetics, cell division, evolution and thermodynamics, and many others, the teacher should bring real plants and animals (specimens) or their models for the students to see and use in real situations. Some of these materials are readily available in the school environment. It is only when the specimens are not possible to get, then the teacher can use the alternatives. All these make the teaching and learning to be real and assist the students to achieve better in their studies.

A gradient is a way of doing things level by level, and systematically (i.e., systematically). A steep gradient is a way of doing things, which does not follow this systematic order by jumping steps. The gradient of a learning material is represented by three dimensions, which determine the difficulty of how it would be learned. They are the dimensions of abstractness, complexity, and sophistication (Abimbola and Danmole, 1995). The abstractness of a concept varies from concrete to abstract in terms of its accessibility to observation and visualization. The complexity of a concept varies from simple to complex, in terms of how many other concepts are subsumed by a given concept. The sophistication of a concept depends on the degree of its refinement for learning purposes. It varies from descriptive level, through comparative level to quantitative level. The easiest concepts to learn are simple, concrete, and descriptive, while the most difficult concepts to learn are complex, abstract, and quantitative. Teachers teaching with a proper gradient strategy will teach with orderliness, and as a result, the students from such class will learn well.

Figure 1 is a two-dimensional representation of the gradient. The structuring of materials for learning will move gradually through the ladder to have an appropriate gradient.

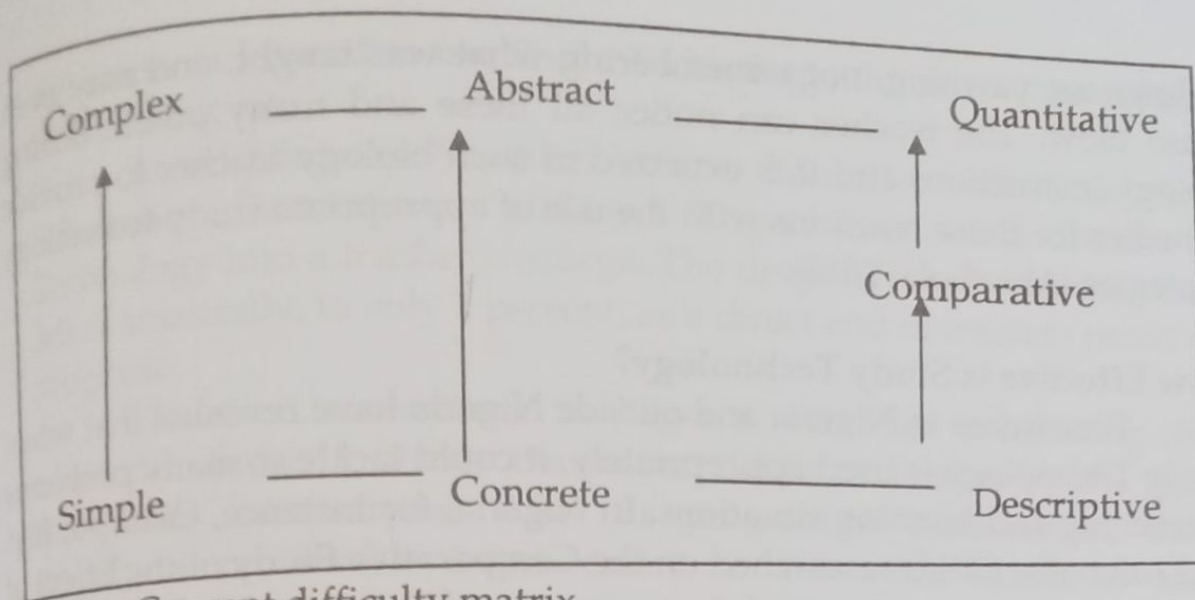


Figure 1. Concept difficulty matrix

Hence, in teaching biology, the easiest way to teach is to teach concepts that are simple, concrete, and descriptive. This shall be easier than to teach concepts that are complex, abstract, and quantitative (Abimbola, 2011). Using the Basic Ecological Concepts as a main topic as an example, with the sub topics of Ecological Terms, Components of Ecosystem, Local biomes, Major biomes and Population studies by sampling method, The Ecological terms shall be taught first before Components of Ecosystem. In addition, in terms of abstractness, Local biomes, which are the biomes in Nigeria, shall be taught before the Major biomes in the World. While the Population studies, which is descriptive shall also be taught before the Biomes. Again, Biomes in Nigeria can then be taught, and compared with the World Biomes. That is, if the biology teacher would follow this concept difficulty matrix the teaching of biology can be achieved systematically.

A misunderstood word is a word that is **not understood at all, or wrongly understood**. A word that is not understood at all is called a misconception. A word that is wrongly understood is called an alternative conception. In biology, things that can be misunderstood are words, concepts, or diagrams. To remedy misunderstood words the teacher clears the words, using standard dictionaries or biology dictionaries. Experts have revealed that this is the most important barrier. Where both teacher and students clear the words, use words in sentences repeatedly until they are properly understood, then, learning becomes meaningful and permanent.

Physical and mental reactions that students could exhibit because of barriers to study are angry, bored, headache, eyes hunting, confusion,

reelingness, yawning, not remembering what was taught, and may even cause blow. The teacher can notice all these and many others during biology instructions and it is expected of such biology teacher to provide remedies for those reactions with the use of appropriate study technology strategies (Abimbola, 2015).

How Effective is Study Technology?

Researches in Nigeria and outside Nigeria have revealed that when Study Technology is used appropriately, it could tackle so many problems in teaching and learning situations. In Nigeria, for instance, Oladipo, Biyi and Adenaike (2012) researched on the Comparative Study of the Effect of Study Technology Mode of Instruction and Lecture Method on the Academic Performance of University Students in Nigeria. The findings of their research revealed that exposure of students to Study Technology improved students' academic performance; because it increased the distinction, level of the students exposed to the technique in the course of instruction and greatly reduced the failure rate.

Abdulkadir (2011), researched into the effect checksheet, on senior secondary school students' performance in biology in Kwara State, Nigeria. She reported that students exposed to the use of checksheet in their instruction performed better than the control group students who were not similarly exposed to the use of checksheet. In addition, Abimbola, Ahmed and Gbigbadua (2012), all of the University of Ilorin, Ilorin, Nigeria, worked on the effects of pre-instructional word-clearing strategy on students' achievement in biology, while Adeoye (2015) equally used "Demokit" as an instructional strategy to teach genetics to biology students in Omu-Aran, Kwara State, Nigeria. All their findings revealed that, with appropriate use of study technology as tool and techniques, better achievement is enhanced in the teaching and learning. With biology in particular, Abdulkadir (2011), Gbigbadua (2014), and (Adeoye, 2015) works also revealed that using checksheet, word clearing, and "Demokits," respectively, has assisted the students in the learning of nervous coordination, genetics, and ecology.

Not only this, students who learn and apply Study Technology consistently achieved remarkable improvements in their scholastic progress. Numerous studies have demonstrated these results: In Mexico City, for example, Study Technology was introduced into a private high school in which one class had a 95% failure rate on their material. After

the students learned to use Study Technology, the same class achieved a 90% passing rate.

In addition, in Southern Africa, Education Alive, an Applied Scholastics International affiliated Organization, introduced Study Technology into a teacher's college. The dropout rate for teacher trainees fell dramatically, to only 2 percent, as a direct and immediate result of the program.

However, researchers in Nigeria were just conducting formal empirical studies to verify the earlier claims of success by the Applied Scholastics International. After its programme intervention, there is usually a remarkable improvement in the achievement of student participants.

Conclusion

Once the biology teacher is able to identify what constitute barriers to their students' learning, if such barriers are removed and overcome with appropriate principles and strategies involved in study technology, such as provision of "mass," avoidance of a steep gradient, and clearing misunderstood words with dictionaries, then, the teacher can teach effectively and students can learn perfectly.

Apart from this, biology teachers who use study technology as tools and techniques in the classroom situation would become "different teachers" among others, because of the orderliness in the arrangement of biology contents, both in the theories and practical aspects. With this, learning becomes meaningful and permanent, and students from such classes achieve better than others can achieve.

Revision Questions

1. Mention five reasons why students should learn how to learn biology.
2. Choose a topic in biology and describe how it can be taught to SS1 students with "mass," avoiding "skipped gradient," and using dictionaries to clear any misunderstood words.
3. Explain the following terms in Study Technology, namely:
 - i. Mass
 - ii. Demokit
 - iii. Skipped gradient
 - iv. Word clearing
 - v. Barriers to study

4. As a biology teacher, describe how you will teach a particular topic using study technology strategies and teach the same topic without using study technology strategies. Are there differences in your students' performance and attitude in both classes?

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