THE ROLE OF TEACHING–LEARNING MEDIA IN TEACHING BIOLOGY IN OBE–CLASSES.

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SUMMARY

The following keywords were used: teaching-learning media, teaching aids, Biology teaching, Secondary schools and OBE.

A review of literature concerning teaching-learning media and the factors that influence the choice of teaching-learning media was conducted, in order to establish which teaching-learning media teachers are using to present a lesson, especially in OBE. The classification of teaching-learning media by different media specialists was looked into, before it was applied in a Biology lesson. The plant cell and animal cell sketches were used as examples to draw up transparencies, overlay-transparencies and to build models.

An empirical investigation was undertaken to investigate which teaching-learning media teachers are using and why they are using certain teaching-learning media. It also investigated the role teaching-learning media plays in presenting a lesson and what can be done to help teachers to use more effective teaching-learning media in teaching Biology as part of Natural Science in the senior phase of OBE.

According to the investigation teachers seem to stay with the traditional teaching-learning media, such as the chalkboard and textbook, for they are easily available, user-friendly and cost saving. However, there is a need that more courses should be offered, where teachers can be trained how to use certain teaching-learning media and how to create their own teaching-learning media.

OPSOMMING

Die volgende sleutelwoorde is gebruik: onderrig-leermedia, onderrig-hulpmiddels, Biologie-onderrig, Sekondêre skole en UGO.

'n Literatuuroorsig is gedoen van die verskillende onderrig-leermedia en die faktore wat die keuse van 'n medium beïnvloed in die onderrig in UGO-onderwys. Daar is 'n literatuurstudie gedoen oor verskeie media-kenners se klassifikasies van onderrig-leermedia voordat dit toegepas is in 'n Biologie-les. Die plantsel en diersel is as voorbeelde gebruik om media soos transparante, oorleg-transparante en die bou van modelle te illustreer.

'n Empiriese ondersoek is geloods om vas te stel watter onderrig-leermedia onderwysers gebruik en waarom hulle sekere media gebruik. Die rol wat die media speel in die aanbieding van 'n les, asook wat gedoen kan word om onderwysers te help om ook van ander media gebruik te maak in die onderrig van Biologie, as deel van Natuurlike Wetenskap, in die senior fase van UGO-onderwys, is nagevors.

Na aanleiding van die ondersoek is bevind dat onderwysers steeds van die tradisionele onderrig-leermedia soos die skryfbord en handboek gebruik maak om 'n les aan te bied. Die redes hiervoor is dat hierdie media maklik bekombaar is, maklik is om te gebruik en kostebesparend is. Nogtans is daar 'n behoefte dat kursusse aangebied moet word, waar onderwysers opgelei kan word om sekere onderrig-leermedia te gebruik en hoe om hul eie media te kan maak.

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CHAPTER 1

INTRODUCTION, PROBLEM STATEMENT, AIM AND METHOD OF RESEARCH

1.1 ORIENTATION

Education in South Africa has moved to a new OBE-system of teaching, where learners participate more and continuous assessment takes place. However, teachers still find it difficult to teach where they only have to facilitate and teaching-learning media is not available.

In this chapter an overview of the importance of media is given. The aim is to determine what teaching-learning media teachers are using and what can be done to assist teachers.

This research deals with the teaching of Biology, which is an integral part of Natural Science (NS), in the senior phase (Grade 7-9), in the OBE-system.

1.2 BACKGROUND TO THE STUDY AND MOTIVATION

Le Grange and Reddy (2000:21) quote science educators' views on OBE and Curriculum 2005 as varied. Here are some of their views:

- "I don't know enough to form solid opinions"
- "I'm still in the dark"
- "I need more information"
- "It is a mystery and I'm looking for someone to solve it"
- "All I know is that learners must acquire certain pre-planned skills"

- "It should be implemented gradually"

- "It sounds good on paper but how do you manage with 58 learners in your class"

- "Not everything in the old system was negative"

According to Nyamane (2002:27) the science educators' views mentioned above are indications that the majority does not know much about the newly Outcome Based-Education way of teaching,. Their statements also reflect an element of fright and flight in some, and confusion in others.

It seems teachers are at a loss of what and how to teach pupils in the classroom. Outcomes-Based Education (OBE) creates a platform from which specific outcomes (SO's) must be reached which in turn is narrowed down by the assessment criteria (AC's) prescribed, but what the teacher must actually teach and convey to the pupils is confusing. Textbooks are becoming outdated and teachers have an immense problem in what to present to the pupils in order to actually teach them something to achieve the SO's. There are many new OBE textbooks for Natural Sciences (NS) available and these are probably the main sources that teachers use (Jacobs *et al.*, 2002: 175; Anderson & Helms, 2002).

There are libraries full of material and a wealth of biota around us. It is the opinion of the researcher that in OBE the role of the teacher in the Biology class is to help learners to equip themselves with knowledge and understanding of all these wonderful things around us and of which we ourselves are an integral part.

The anxiousness of learners to become aware of these natural interactions will lead to successful learning in school (Von Rhonek *et al.*, 1998:563). According to Cawood *et al., (1*982:178) there are six levels of learning ranging from direct contact to representing reality in the written word. It is thus imperative that the teacher uses more than just the textbook.

The impact of visual aids is important. When combining pictorial and written analogies in a reading guide, it might have a greater impact than an analogical study guide alone. Pictorial analogies make a greater contribution to learners' visualization of abstract material. Supplementing text analogies with explicit guide material in the form of a study guide will further assist learners' understanding of difficult concepts (Bean *et al.*, 2001:233).

According to Blignaut *et al.*, (1970:309) and Jacobs *et al.* (2002:243) research has shown that a learner learns:

- 1% through taste;
- 1½% through touch;
- 3½% through smell;
- 11% through hearing and
- 83% through visual experience.

Retention or recalling of what was learned is also linked to sensory experience. It is indicated that a learner will remember as follows:

- 10% of what he or she has read;
- 20% of what he or she has heard;
- 20 – 30 % of what he or she has seen or observed;
- 50 – 65 % of what was seen and heard;
- 70% of what was said and
- 90% of what was said and done.

According to Vreken (*s.a.*:12) learning content can also be presented in a more clear and precise way when visual media is used, especially when learners are taught in a second language. The visual media supplement the spoken word.

Hughes (1998:23) noted that the impact of science (researcher: in this case - biology) on the people's everyday lives have generally not been part of the awareness of most South Africans.

1.3 RESEARCH QUESTIONS

1.3.1 What teaching-learning media teachers use for the effective teaching of Biology in the senior phase.

1.3.2 What teaching-learning media are teachers using in the teaching of Biology at this moment?

1.3.3 If teachers are not using teaching-learning media, what are the reasons for that?

1.3.4 What should be done to make teaching-learning media (a) more available to teachers and (b) to help them integrate the media in the teaching and learning of Biology?

1.4 THE AIM OF THE RESEARCH

The aims of the research are to determine:

1.4.1 the teaching-learning media that teachers can use for the effective teaching of Biology in the senior phase.

1.4.2 the teaching-learning media that teachers are using at this moment for teaching Biology in the school.

1.4.3 what the reasons are if teachers are not using teaching-learning media.

1.4.4 what could be done to make teaching-learning media more available for the teaching and learning of Biology within an OBE-content.

1.5 THE DESIGN OF THE RESEARCH

1.5.1 LITERATURE SURVEY

To be able to attain research aim 1.3.1 a literature study was done. A search was executed on the EBSCOHost base, using the following keywords: teaching-learning media, teaching aids, Biology teaching, secondary schools and OBE. By using the NEXUS-data base existing relevant research reports was traced.

1.5.2 EMPIRICAL STUDY

1.5.2.1 QUESTIONNAIRE

An empirical study (field survey) was performed in which a questionnaire was used to try and attain aims 1.4.3 and 1.4.4. The questionnaire covered aspects such as:

- The role teaching-learning media presently plays in the teaching and learning of Biology.
- What teaching-learning media are available in schools?
- What is the quality of these teaching-learning media?
- How user-friendly are these teaching-learning media?
- What teachers think should be done about the teaching-learning media problem in the OBE-context?

1.5.2.2 POPULATION AND SAMPLE

The target population was defined, because of financial and area restrictions, as schools being in the district of Sedibeng West in the Vaal Triangle. Out of the above ± 50 teachers teaching Biology as an integral part of NS were used.

1.5.2.3 PROCESSING OF DATA

A descriptive analysis was done and the data was collected with the aid of questionnaires prepared in cooperation with Professor Vreken, based at the North-West University (Potchefstroom Campus) to determine the role, effectiveness, availability and quality of teaching aids, media and other resources for teachers in teaching Biology in schools. This was done using the SAS-programme in consultation with the Statistical Consultation Services of the North-West University .

The research procedure was as follow: A questionnaire was prepared and taken to the target groups (different Secondary Schools in the D8 district) to complete. The questionnaire consisted of multiple questions. All the questionnaires were analysed and used for this research. After processing the data, conclusions were drawn as what teaching-learning media teachers are using, what teaching-learning media are available at schools, what should be done to assist teachers in the use of teaching-learning media.

1.6 THE IMPORTANCE OF THE STUDY

The value of this research was to establish what media teachers are using and to bring an awareness to teachers that there are resources available that is not necessarily prescribed by the Department of Education that can be very valuable in teaching Biology in an OBE-context. Furthermore teachers were made aware that the chalkboard and textbook are not the only resources available to them.

1.7 FEASIBILITY OF THE STUDY

As the researcher is a resident in the Vanderbijlpark area and is teaching in Vanderbijlpark it was possible to ensure that the questions are explained to teaching staff and that the questionnaire was completed as accurately as possible for obtaining statistical data and to come to definite conclusions.

1.8 DIVISION OF CHAPTERS

Chapter 1 - Problem statement, aims and method of research.

Chapter 2 - An overview of teaching learning media.

Chapter 3 - The use of teaching-learning media in teaching and learning Biology in OBE.

Chapter 4 - Empirical study - questionnaire and statistical data.

Chapter 5 - Summary, findings and recommendations.

1.9 CONCLUSION

In this chapter the concern about what type of media teachers are using to teach Biology was recognised and why teachers are using only certain media, even though as a result of the OBE-system, a wide range of teaching-learning media can be used.

In chapter 2 different types of media will be described. Various opinions and classification of different media specialists will be described. But before choosing any specific kind of media, the advantages and disadvantages should be kept in mind by the educator. These factors will also be discussed in chapter 2.

CHAPTER 2

AN OVERVIEW OF TEACHING-LEARNING MEDIA.

2.1 INTRODUCTION

Sometimes it is necessary to do something in a factual and concrete way for someone to understand it, for example it will be better to show a picture of a bucket than trying to describe how a bucket looks like. After picture writing led to the first alphabet it was a relatively small step to the written word and the literature that followed.

Teachers in ancient Greece used the poems of Homerus and the fables of Aesopus as models of ideas, but the first real textbooks, however, was written in old Egypt. By the time of the middle ages textbooks, models, maps, charts, and the blackboard were already in use. All the teaching aids that were used in the classroom depended on the initiative of the individual teacher and his or her ability to actually create or build it (Conradie, 1977: 10 – 12).

The art of book printing did obviously greatly improve the use of school textbooks. For centuries the use of other teaching aids was not deemed so important. From about the sixteenth to the nineteenth centuries teaching was done mainly through the "chalk and talk" method with a few textbooks as aids. John Comenius (1592 – 1670) already pleaded for more extensive use of audio-visual aids and also more illustrations in school textbooks. John Dewey (1859 – 1952) had a big influence in educational circles and his plea for bigger freedom and more adaptability in the classroom found big support and led to the modern "communication explosion" in education (Conradie, 1977: 10 – 12).

Many of the traditional teaching media that stem from that period are still in use today such as:

- textbooks
- chalkboard
- pictures
- posters
- models

- maps and charts, and
- diagrams

(Conradie, 1977: 10 – 12, Cox, 1998, Jacobs *et al.*, 2002:246).

In this chapter an overview of the opinions and classifications of media by Gerlach, Schramn, Coger, Romiszowski, Ellington, and Marais will be given. A general overview of different media such as the chalkboard, transparencies, pictures, models, television and computer education will be looked into. The advantages and disadvantages of these media will be explained and should be taken in consideration before using a teaching-learning medium.

If a teacher wants to be effective in preparing the young people of today for a meaningful life in the future, they must keep pace with changes, they must adapt new methods and constantly review their techniques. "The old education created by a simple stable world of primitive media, focused on simple values of social life within the family and simple career lines within a slowly changing economic world has a travesty of educational-morality. The only insurance against future shock is to educate for a changing future" (Conacher, 1983:37).

"Teachers should not be like the old lady who lived in a shoe and should not die while they are up to their elbows in dirty dishes. They should see what the media salesman at the door has to offer to make their work easier and more effective" (Conacher, 1983:39).

A teaching aid or medium has no value in itself; its value is obtained through the manner in which it is applied or used. The teachers' didactic appreciation and initiative will always be the decisive factor whether the aid or medium will be successful.

2.2 DEFINITION OF TERMS

An explanation of the terms **media** and **teaching-learning media** is important so that it is clear what is meant by these terms.

2.2.1 DEFINITION OF MEDIA

Media can be seen as a medium, broadly conceived, any person, material, or event that establishes conditions which enable the learner to acquire knowledge, skills and attitudes (Jacobs *et al.,* 2002: 240). Reiser & Gagne (1983:5) define education media as: "……..the physical means by which an instructional message is communicated."

Generally, media are selected on their ability to present the events of instruction (Reiser & Gagne, 1983:5) and to facilitate the achievement of stated objectives (Gerlach & Ely, 1980:240).

According to Mayer (2001:1) media refers to the presentation of material using both words and pictures. He further states that learners can better understand an explanation when it is presented in words and pictures than when presented in words alone.

According to several researchers media can be defined as all the methods and material that can be used to support the learning process (Dugger *et al.*, 2001:32, Perraton, 2000:31, Cheek & Walsh, 1996:46).

Atherson (2003) quotes Marshall McLuhan's famous words that "the medium is the message". In teaching the medium is certainly a message. The use of any adjunct to the voice sends a message to the learners, which will be received and understood at least out of consciousness and perhaps explicitly.

Media can be seen as any medium or method that are used to present a message.

2.2.2 DEFINITION OF TEACHING-LEARNING MEDIA

The terms 'teaching' and 'learning' are associated with the introduction (explaining, elucidating, etc.) and learning of knowledge. This transfer of information is accomplished by using certain symbols. When we speak, read or observe things we use symbols, which represent specific information to give meaning to those things we are observing. For example a red ladybird is a definite symbol of danger (Jacobs *et al.,* 2002:245).

Teaching-learning media can be seen as many different kinds of media used to introduce (explain, elucidate, etc.) the learning content to the learners, so that the learning that takes place by the learners can be effective (Vreken, s.a.: 6,7).

A teaching-learning medium can be defined as an object the teacher uses, or which is given to the learners to use, to achieve specific teaching and learning outcomes. It is not only apparatus or pictures, but include many other types of learning experience (Jacobs *et al.*, 2002:240).

Teaching-learning media can therefore be defined as any medium a teacher uses to present a lesson effectively. There is so many different media that can be used, that the classification of media by different specialists will be looked into.

2.3 CLASSIFICATION OF MEDIA BY VARIOUS MEDIA SPECIALISTS.

Media can be classified into different types, such as visual, audio, computer based, live biota, excursions, etc. Media specialists have classified it in different classes and therefore make it easier to recognize and select the right one for the teaching-learning situation.

The classifications of Ellington, Marais, Romiszowski, Gerlach, Schramm and Coger will be discussed in order to indicate the progress of how media have been classified earlier and how it is classified now.

2.3.1 ELLINGTON

The contribution of learning theories to media selection motivated Ellington to base his media selection guidelines on teaching/learning systems (Ellington, 1985:12).

Ellington classified teaching-learning systems into three broad groups:

- Mass instruction
- Individualized instruction
- Group instruction

According to him mass instruction place the teacher in a traditional expository role as controller of the teaching-learning process and as a source of information. Learners are generally passive and work at a rate determined by the teacher (Ellington, 1985:13).

Individualized instruction tends to be more learner-centred. A learner work at his/her own pace and the role of the teacher is more supportive, either as a tutor or guide. Group learning is concerned with communication, interpersonal skills and group dynamics. In these instances, the role of the teacher is as a facilitator or organizer of group activities (Ellington, 1985:12).

Ellington does not make a clear classification of how media can be used. He only makes a classification of how a teacher can instruct learners, either by mass, group or individual instruction. Mass instruction will not be a good choice, for the learners are passive in this instruction and they all have to work at the same rate. The teacher is the only source of information and the learners do not develop their skills of communication or investigation. According to the new OBE-system, the teacher should not be the only source of information, but learners should also have the opportunity to express themselves.

2.3.2 MARAIS

According to Marais (1990:5) a proposed teaching objective not only gives direction, it is also indicative of the appropriate teaching method and media best suited to achieve the proposed objectives.

Marais' classification of teaching-learning media is as follows:

- Intrinsic teaching-learning media.

This type of media entails lectures, dramatizing, demonstrations, discussions and assignments.

- Extrinsic teaching-learning media.

It encloses realia, pictures, sound, programs and simulations (Marais, 1990:100).

Marais' classification of media is a little bit of an improvement on Ellington's classification because Marais makes provision for different types of media such as demonstrations, discussions, realia, pictures and sound. The ostensive approach where the teacher is responsible for all the action and the learners are passive will not fit into the OBE approach. Learners can't develop communication skills, and because they are passive, they will have difficulties to express themselves in a society.

2.3.3 ROMISZOWSKI

Romiszowski (1974: 60-63) supports the "sensory channel" classification of teaching-learning media. He classifies media into the following categories:

- Audio
- Audio/Visual
- Visual and Tactile / Kinaesthetic

He recommends that media be considered according to both essential media characteristics, which control the clarity of the message and optional media characteristics, which improve the quality of a presentation (Romiszowski. 1974:63).

He supports both cognitive learning theories and the application of the system approach. He stresses the importance of the precise statement of lesson objectives in behavioral terms, with regard to the systematic design and evaluation of courses (Romiszowski, 1974:84).

Romiszowski is getting more specific with his classification of media. It is very important for learners not only to see and hear, but also to touch and feel.

Teachers can decide what they want to achieve with the media they are going to use, whether the learners are only going to listen; or listen and see; or listen, see and do. There is an apt Chinese saying:

I hear and I forget.
I see and I remember.
I do and I understand.

The best way to teach is to use a medium where the learners will understand an explanation the best (Jones, 1997:1).

For the OBE-system, this method, where the learners can hear, see and do are very good. Making use of the hearing, seeing and touching senses address different skills of the learners. Learners will be able to understand and remember much better, than by only hearing or seeing the information.

2.3.4 GERLACH & ELY

Gerlach is more specific with his classification of media. In his classification the teacher can use more media to assist with the presentation of information.

According to Gerlach and Ely (1980:247) media are classified into six categories:

- Still pictures
- Motion pictures
- Television
- Audio recordings
- Real things/simulations/models
- Programmed and computer-assisted instructions

Gerlach and Ely have covered a large range of variety of media, which can all be used in teaching. Photo's and pictures are very good examples of still pictures to show the learners how camouflage and mimicry for example looks. Motion pictures, television and audio

recordings are important to let the learners hear the calls of the bushveld for example. Computer-programs where learners can explore more information are very good for hand and eye co-ordination. The best for OBE is still where the learners can see the real thing, where they can touch and feel it, for example reptiles.

2.3.5 SCHRAMM

Schramm divides media into "big media" and "little media". Under "big media" he classifies the television and computers, the more expensive material. Under "little media" he classifies transparencies, textbooks and videos, the less expensive media material.

According to Schramm (1977:21-22) a teacher should before choosing a medium consider the effectiveness of a medium against other media. The financial resources should be measured against the resources available and the competing needs.

Schramm classifies the different media from the chalkboard to the computer into four groups:

Group 1: Chalkboard, models, dramatising, maps and demonstrations.

Group 2: Textbook, workbook and tests.

Group 3: Photo's, radios, videos, films and educational television.

Group 4: Language laboratories and computers.

Schramm has even got a more specialized classification of media. Many schools in townships do not have "big media", such as computers and televisions. Therefore 'little media" is likely to be used more commonly in all schools. Media such as transparencies, models built by the learners, textbooks, periodicals like Conserva, Fauna and Flora can be used very effectively. The OBE-approach makes it very easy for the teacher to get information from any source to teach the learners. Textbooks in conjunction with other sources, newspapers for example, can be used to explain a topic like AIDS to the learners.

2.3.6 COGER

Coger's classification of media is still one of the best. He distinguishes firstly between concrete and abstract information, and then classifies media into six classes. The basis for the presentation of a lesson should include sensory information concerning physical characteristics, relationships, conditions and changes in one's environment.

Coger distinguishes his taxonomy of media-stimulus characteristics into two main groups:

- Media-stimuli for concrete information
- Media-stimuli for abstract information

According to Coger (1975:72-73) if the subject that is presented can neither be seen or heard, nor experienced through any of the other senses, it is not concrete information but abstract information.

Coger classifies media as follows:

Class 1: The real thing, like living animals, flora and preserved animals.

Class 2: Excursions, educational tours and visits to the zoo, planetarium.

Class 3: Audio-visual media, such as television, videos.

Class 4: Visual media, such as maps, drawings, transparencies and diagrams,

Class 5: Audio media, such as a radio, cassette player and cd-player.

Class 6: Computer based media, such as educational programmes on the computer and information on the Internet.

Coger's classification is very good. It gives a broad perspective on media. Teachers have a large variety of media to choose from. Class 1 will still be the best way to teach biology, for the real thing is the best, where the learners can see and touch the object. Class 2 is good, but not all schools have the facilities and finances to take the learners on excursions. A trip outdoors will definitely motivate the learners more than indoor lessons. Schools can try to get sponsors for such trips. Class 3, like televisions, are not always available at schools and the learner think it is a period to relax and talk instead of listen and learn.

Class 4 will be the one that is most used by teachers, especially the use of transparencies. It is not so expensive and the teachers can create their own transparencies and use it over and over again. Class 5 will be efficient where sound plays an important role for example sound waves and the ear. Class 6 is important to keep the learners updated with the latest information where they can make use of Internet. There are also educational programmes available for computers. The latest development is the so-called e-learning where learning can take place through interactive programmes on a computer network.

2.3.7 CONCLUSION

According to these media specialists media can be classified into the following:

- Visual media - such as the chalkboard, textbook, transparencies, maps and drawings.
- Audio media - such as the radio, cd-player and cassette player.
- Audio-visual media - such as the television, slides, videos and computers.
- The real thing - such as live biota, excursions, models and preserved animals.

The most effective way to teach Biology would be by making use of live biota. Learners do not only see or hear the real thing, but can also touch and smell the real thing, for example by having mice in the classroom, where learners can learn more on the life cycle of mice. By making use of local hospital personnel to come to schools and demonstrate the dangers of smoking and aids would be helpful.

2.4 FACTORS TO BE CONSIDERED BEFORE CHOOSING TEACHING-LEARNING MEDIA.

Before choosing a teaching-learning medium, the teacher should firstly consider a number of factors that can influence his or her choice.

2.4.1 DEVELOPMENTAL LEVELS

The developmental levels, the capabilities, cognitive development and previous experiences of learners should be considered (Avenant, 1980:91). The individual characteristics of learners may influence the choice of teaching-learning media. Teachers should take cognisance of the reading abilities, socio-economic backgrounds, learning styles and motivation of the learners. Teachers must realize that learners do not always comprehend certain concepts until they have been shown concrete or pictorial examples illustrating these concepts (Briel, 1983:15; Esfahani, 1989:16; Marais, 1990: 6). Murray (1989:8) points out that certain learners need certain treatment under certain conditions.

2.4.2 THE NATURE AND COMPLEXITY OF THE SUBJECT

The nature and complexity of the subject matter and the type of learning task facing the learners will influence the selection of both the media and the medium of instruction (Marais, 1990:8).

The teacher should know his/her subject content, to determine what type of media will be the most sufficient (Steyn, 1990:79-80).

If the teacher is going to teach about the morphology of a flower, it would be advisable to collect a few examples of flowers rather than to draw examples on a transparency.

2.4.3 THE INSTRUCTIONAL METHOD

The instructional method being used will determine or limit the choice of teaching-learning media to be used during the presentation of a lesson. To determine the appropriateness of the

medium to accomplish a defined task is important, as well as the physical attributes and capabilities of the teaching-learning media are necessary (Reiser & Gagne, 1983:14).

2.4.4 COMMUNICATIVE PROPERTIES OF THE MEDIA

Teachers should consider which medium would communicate a message more effectively, that is, auditory, visual or tactile media. Teachers need to identify the most appropriate teaching-learning media for presenting these stimuli. According to Guild (1989:14) some learners learn equally well from various media, yet the degree of visual, auditory and kinaesthetic perception required for information processing depend to a large extent on the learning style of the individual learner. In certain instances a combination of these multi-media would be more appropriate or successful.

2.4.5 AVAILABILITY

The availability, reliability and condition of the equipment should be considered. The physical facilities available must also be borne in mind, such as lighting, the possibility of darkening the room and the availability of electricity. The size of a venue for practical lessons would determine the medium of instruction (Briel, 1983:15).

2.4.6 COST

Gallup (1977:34) describes cost effectiveness as follows:

"Within an instructional technology context, cost effectiveness means comparing cost and benefits encountered in utilizing two instructional alternatives to teach the same course content, and then using those comparisons to make decisions on which alternative is the most effective."

The cost of the teaching-learning media should be calculated and compared to the anticipated learning benefits. Teachers should consider whether it is economically viable and time or cost effective to purchase, hire or produce teaching-learning media. Financial constraints may impede conducting identification tests and experiments (Marais, 1990:17).

In case of money restrictedness teachers can produce their own programmes, transparencies, etc. Self-prepared teaching-learning media often suits the teachers more than expensive ones (Vreken. s.a.: 20).

2.5 AUDIO AND VISUAL MEDIA

According to Ittelson (1998) studies in the psychology of learning suggest that the use of audiovisuals in education has several advantages. All learning is based on perception, the process by which the senses gain information from the environment. The higher processes of memory and concept formation cannot occur without prior perception. Persons can attend to only a limited amount of information at a time; their selection and perception of information is influenced by past experiences. Researchers have found that, other conditions being equal, more learning occurs when information is received simultaneously in two modalities (vision and hearing, for example) rather than in a single modality. Furthermore, learning is enhanced when material is organized and that organization is evident to the student.

These findings suggest the value of audiovisuals in the educational process. They can facilitate perception of the most important features, can be carefully organized, and can require the student to use more than one modality (Ittelson, 1998).

2.5.1 THE CHALKBOARD

The chalkboard is one of the oldest media, but is still in use in almost every classroom today. Chalkboards are such simple teaching-learning media that teachers consider it as one of the basic requirements to teach effectively (Davis, 1991).

Advantages:

- It is a cheap medium and can be used over and over again.

- Learners today are more visual orientated than learners of a few years ago, because the world they are living in today is richer in visual stimuli. Learners will respond more to visual media because they know it (Prawat, 1996:289).

- The teacher can use the chalkboard to explain difficult terminology and the learners can use it to recall information.

- The learners can immediately see what is written on the board.

- Different coloured chalk makes the use thereof more interesting and contrasts can lead to better understanding and learning (SIU, 2003).

Disadvantages:

- Information cannot be kept on the chalkboard and has to be wiped out.

- The space is limited on the chalkboard and it takes time to write the information on the chalkboard.

- Teachers write illegible then children are quick to adapt such illegibility. It is therefore important for teachers to set a proper example in what neat and legible writing should be.

- Details in complex drawings are often illegible on the chalkboard (CTL, 2001).

- Learners might become socially isolated, as there is no interaction with others, they just copy information from the chalkboard (Woolfolk, 1995:277-288).

By making use of the chalkboard in the OBE-context is not so good, for the learners have to work in groups and not be isolated and just copying from the chalkboard.

2.5.2 THE TRANSPARENCY

According to the OED (1976, 6:1233) the meaning of transparency is picture, inscription, etc., made visible by light behind it.

Using transparencies on the overhead projector are of the most versatile mediums. The teacher can still face the class and has eye contact with the learners (Petty, 1993:71-72). Transparencies can be used over and over again. It is time saving and learners can even help to make transparencies. Special effects can be obtained like overlapping transparencies to illustrate certain internal organs in the human body. At the end all these overlapping transparencies make up a complete image (Vreken s.a.: 29).

Advantages:

- Transparencies are not expensive to make. Transparencies can be drawn by hand with coloured pens. It can also be made on a copy machine (Ho, 2001).

- It can be produced from drawings, photos, diagrams etc. to present some facts and ideas to the learners.

- It can be used over and over again.

- An excellent technique for using the overhead projector is to switch on only when a visual is being viewed, and then to switch off. This gives the same effect as flip charts, with much more dramatic impact (Romiszowski, 1988:151).

Disadvantages:

- It requires a careful analysis of the content, its complexity and the message that the teacher wants to communicate.

- Most methods of transparency preparation do not cope very well with half-tone pictures or colour photos.
- Transparencies are bulky and heavy to carry.
- Plastic transparencies stick to each other (Ho, 2001).
- Schools and classrooms should have electricity.

The OBE-system requires that teaching should be learner-centred and not teacher-centred. By making use of transparencies it is more teacher-centred than learner-centred, for the teacher does most of the work.

2.5.3 TELEVISION, VIDEOS AND SLIDES

By using television, video or slides the learners can visualize the reality, hear the sounds, see how things (animals or plants) move and they can see the colour of the animals or plants (Jost, 1990:19).

Advantages:

- Educational television on SABC can be used to reach a lot of learners at the same time.
- It is very useful to reach learners in rural areas, they can watch it on television, for some of them are far away from schools and are difficult to reach. Some of them are poor and cannot afford any transport. This is where a television is helpful to reach a lot of them at once.
- Information can be made visible to more learners at the same time, what would normally be visible only to one, for example an image of a plant cell seeing under a microscope.
- Teachers can make their own videos at home on interesting programmes that they can use in teaching.
- Teachers can use the video over and over again until the content is mastered.

- Important information can be watched in slow motion, programmes can be interrupted, reviewed and edited (Briel, 1992:2, Vreken, s.a.: 41).

- Videos can be used as advance organizers to enhance recall of previous learnt information. Even experiments that would be dangerous to operate in a classroom can be shown on a video and learners can always watch the experiment over and over before going to the next practical.

- The video as medium is effective to illustrate events that would have taken place in a couple of chapters, for example photosynthesis, mitoses, reproduction or fertilization.

- Learners prefer to watch educational programmes on television or video than to read it in books. "The film takes place in one comprehensive sitting where pupils can follow everything from one scene to another ..." (Eberlein *et al.*, 1979:209).

- The video is also useful where objects are too small to see with the eyes, for example life on the sea bed, events that take place too rapidly or too slow for us to see, hidden objects (camouflage and mimicry) and large objects (Vreken, s.a.: 40).

Disadvantages:

- Educational programmes are only broadcasted once on SABC television and there is no time to reminisce.

- The presentation is short, thus only a small quality of information can be remembered.

- Good course material is expensive to produce and to broadcast on television.

- This medium overlooks the individual differences of learners and the right of learners as individuals to an education geared to their potential and their peculiar needs.

- The degree of interactivity between the learner and teacher and between the learners is very low.

- The teacher makes no eye contact with the learners and cannot keep their concentration and interest.

The learner who needs additional attention or is a slow worker will not benefit from videos, television or slides. In the OBE-context it is important to identify the learner who has different needs, for example a learner with learning problems or a learner who should be given extra work, will have to do the same. One will feel frustrated and the other one discourage.

2.5.4 RADIO, CASSETTE AND CD-PLAYER

The hearing senses play an important role, especially when a cassette or cd-player is used to demonstrate different animal sounds. Sounds that the learners normally would not hear, e.g. call of a fish eagle, cry of a jackal, etc. can be recorded and played to the learners. Sounds and verbal words can be repeated so that the learners can make an association.

Advantages:

- If the listening situations are planned carefully, the cassette or cd-player experience can through the combined effect of voices, environmental sounds and music, capture the learner's attention and imagination (Mobbs, 1984:90, Parsloe, 1983:86).

- Learners' vocabulary will improve by listening to verbal words and conversations on the cassettes or cd's.

- This method is relatively cheap and highly mobile and also spans time and space, such as the sound of birds singing or a cascading waterfall

Disadvantages:

- If this medium is not carefully planned, the learners will become bored.

- Learners are passive, for they only make use of their hearing sense.

- If there is too much information, the learners will lose interest.

- If the learners cannot see a picture or photo of a fish eagle for example, they cannot make an association, and learning becomes a problem.

- The problem with radios are that not all schools at different places can receive a certain bandwidth or frequency at a specific place (Romiszowski, 1988: 163).

In the OBE-context the learners learn the best when they are active. By listening to the radio, cassette or cd-player, they become passive learners and even become bored.

2.5.5 CHARTS, DIAGRAMS, PICTURES AND POSTERS.

Charts, maps, pictures, posters, flash cards and diagrams can effectively be used to visualize an object and to interpret it. Posters can be used to catch and hold the attention of the beholder long enough to implant a significant idea the mind. Pictures speak a universal language "a picture paints a thousand words".

Advantages:

- Pictures surpass borders of time and space, eg. *life under the sea and craters on the moon* .... All children all over the world experience these.

- Through this visual medium the learner also learns to socialize.

- The learners also develop their communication skills, as they communicate and debate over certain aspects on pictures of AIDS for example.

- Learners can make their own posters and posters can be used to highlight or summarise main points.

- Small objects, that could otherwise not be seen with the naked eye, for example a sperm cell, can be enlarged and shown on cards and screens.

- Flashcards can be used to emphasize important keywords (Vreken, s.a.: 27).

Disadvantages:

- The pictures should be explained in many circumstances to convey the proper message and meaning thereof. As a child will inevitably put a meaning to the picture that fits his or her own experience that could be misleading if it is not explained properly.

- Pictures should be simple and not abstract and complicated otherwise the real meaning may be lost in confusion (Davis, 1991).

- Rare or unknown life animals should be pictured in their natural environment so as to give the child the real impression and understanding of such an animal.

Learners can make or draw their own posters with drawings or illustrations. In the OBE-system the following should be assessed: skills, knowledge, values and attitudes. Learners are actively involved in the lesson and develop their creativity skills.

2.5.6 MODELS

Teachers often bring samples of objects into the classroom or take the class to view the real thing in its natural environment. Sometimes it is not that easy, for the classes are too large or the real thing is too small to be seen with the naked eye. Then the teacher turns to an alternative display, a model of the real thing.

Advantages:

- If the real thing cannot be seen a model is the best way to demonstrate it (Romiszowski, 1988:103).

- Models can be more effective when irrelevant detail is omitted.

- If the third dimension plays an important part in the lesson, then a model will achieve excellent results.

- Models are used when the shape of the object is complex and must be shown.

- Models are ideal to use when the inside detail must be observed and when there is so much detail, all relevant, that pictures are unclear or misleading (Romiszowski, 1988:105).

Disadvantages:

- If the shape, texture or inside structure is unimportant a picture will probably be just as good.

- Too much detail or realism may hinder the communication of the message.

2.5.7 COMPUTER-BASED MEDIA

The last few decades have put tremendous pressure on the use and utilisation of modern technology on the educational system (Bates, 1995: 228). At present we are experiencing what is called the informational and technological revolution and it is absolutely vital that the educational system stays abreast with the latest technologies and informational systems.

Advantages:

- In the early seventies it was already pointed out that the computer was the answer to many related educational problems such as a shortage of qualified teachers, overloaded syllabi, rapidly changing learning contents, overcrowded classrooms and essential adaptation to individual learning needs (Conradie & Du Plessis, 1980:78).

- By using the computer the learners can get the latest information by using the Internet. The Internet is a worldwide connection of computer networks and more than 50 000 networks and billions of users are part of this (Charp, 2000:13; Pedroni, 1996).

- The influence of the World Wide Web (www) as a new concept in technology, the library on your desktop and a dictionary at your fingertips and the sound at your ear (Kruse & Kel, 2000:11). By making use of search engines like Google, Yahoo, Lycos, Infoseek, Magellan, etc. learners can have an international library in front of them (Strydom, 2000:96; Branston & Stafford, 2003:270). Communication can be sent and received through the Internet. Through the IRC (Internet Relay Chat) learners can participate in any discussion and get useful information (Harris, 1996:86; Plotnick, 1997:3).

- The computer can be used for collecting information, whether it is in the form of words, pictures, logical statements, music or events. Any kind of information can be fed into the computer as long as it is coded into digital form (Megarry *et al.*, 1983:16-17).

- By using the computer the learners can communicate and exchange information with each other.

- The teacher acts as a facilitator and the learners learn out of own experience (Marquardt, 1999: 38; Tapscott, 1999:9; Whitten *et al.*, 2000:34; Driver *et al.*, 1994:486; Rothwell & Sredl, 1992:389).

- The computer can be used to provide corrective feedback on learners' performance or progress (Heinich *et al.*, 1989:366).

Disadvantages:

- Computers are very useful, however they are an expensive medium, especially Internet. When computers are used there should be a computer centre that can be locked properly with alarm systems. When learners use the Internet the school has to pay for the Telkom telephone line, which is necessary for installing Internet.

- Some learners will misuse the Internet and will go into porno-websites.

- Lewin (1999:16) points out that there are only a few teachers that really know how this modern technology works, especially the www concept, and how to incorporate it with the OBE-system. The majority of teachers are either not interested or do not know how to use the computer as a medium to assist them in teaching.

- It is also a big security risk for schools that can't afford the insurance costs to safeguard their property and equipment against theft and vandalism.

- By making use of Power Point, there shouldn't be too much graphics, for it may distract the learners from the message they are supposed to received (Cox, 1998).

Some useful Internet web sites for teaching-learning media:

- www.appcpenn.org

- www.media.lit.org

- www.mediaandthefamily.org

2.6 COMPUTER-ASSISTED EDUCATION (VIRTUAL CLASSROOM)

Computer-assisted learning entails the use of the Internet through the www (world wide web) and the use of a dedicated mail server. The environment where each student sits at his computer at home and the teacher presents his class through the server is called a 'virtual class room' (VC). The teacher in a VC copies as closely as possible events that take place in a real

classroom. An actual VC (virtual class room) can be viewed at: <http://hagar.up.ac.za/rbo/classrm.html> (Clarke, 1996; Watson, 2003:231).

2.7 CONCLUSION

As so many different media are available to a teacher, from the chalkboard to the computer, learners don't have to be bored in classrooms or not be able to understand certain aspects from a lesson. The teacher plays a very important role in the use of the correct media, to communicate and explain terminology, although OBE requires that teaching should be learners-centred, the teacher still acts as a facilitator and explain difficult terminology to the learners. Before choosing any medium the teacher has to consider factors such as the costs, the availability of teaching-learning media, etc. The teacher should be able to know how the specific medium operates which is going to be used.

When methods of teaching are expanded to include the TV, demonstrations, multi-media, etc., more learners will be reached and their individual learning needs will be met than would have been the case if the old traditional methods of teaching, like the chalkboard.

In chapter 3 we will look at how some of these media can be utilised in the teaching of Biology as an integral part Natural Science in the senior phase of OBE.

CHAPTER 3

THE USE OF TEACHING-LEARNING MEDIA IN TEACHING AND LEARNING BIOLOGY IN OBE.

3.1 INTRODUCTION

In this chapter the use of audio-visual media in the teaching of Biology will be looked into. South Africa has opted for outcomes-based education. OBE calls for a learner-centred education with flexible curricula that can be easily adapted to individual learner's competence (Prawat, 1996:215-220).

The ultimate goal of science education is to empower learners with knowledge and skills that are commensurable with those of scientists. OBE does not spell out explicitly the nature and especially the structure of scientific knowledge that the learners are expected to construct, but there are differences between the old approach of teaching and the new approach (OBE), which is the government's way to fix the "apartheid- era" education system (Bengu, 2001).

According to the OBE-system learners have to explore, but if they don't have the knowledge or material such as internet, libraries or books they cannot explore. Teachers are still the main "source" of information for the learners.

In the new way the learner determines his/her own rate of learning whereas in the old way the prescribed syllabus was the indicator. Teaching should now be learner-centred and not teacher-centred anymore (Priestman, 1984:183).

Table 3.1 indicates the comparison between the old teacher-centred way of teaching and the new learner-centred way. This can then also help the teacher in selecting and/or preparing media for teaching in OBE.

Old Approach	New Approach (OBE)
1. Passive learners	Active learners
2. Exam-driven	Learners are assessed on an on-going basis
3. Rote-learning	Critical thinking, reasoning, reflection and action
4. Syllabus is content-based and broken down into subjects	Integration of knowledge; learning relevant and connected to real-life situations
5. Textbook / worksheet-bound and teacher-centred	Learner-centred: teacher is facilitator; teacher constantly uses group-work and team-work to consolidate the new approach
6. Sees syllabus as rigid and non-negotiable	Learning programmes seen as guides that allow teachers to be innovative and creative in designing programmes.
7. Teachers responsible for learning; motivation dependent on the personality of teacher	Learners take responsibility for their learning; pupils motivated by constant feedback and affirmation of their work
8. Emphasis on what the teacher hopes to achieve	Emphasis on outcomes, what the learner becomes and understand
9. Content placed into rigid time-frames	Flexible time-frames allow learners to work at their own pace

Table 3.1 Comparisons between the old system and the new OBE-system (Olsen, 1998:18-19).

3.2 THE USE OF DIFFERENT MEDIA AS USED IN BIOLOGY

Some of the media that can be used to teach and learn Biology effectively will be looked into. Learners are often left perplexed, with a handful of disconnected concepts that they have to master in order to pass a grade, instead of making the information more understandable. By making use of different media types, learners will be able to understand the information much better.

According to Allers (1995:82) and Cawood *et al.* (1982:195) media in Biology can be classified from live biota to visual media. They recommend that using the real object is the best way to teach biology, for example if the learners can see, touch and smell an Aloe, they will remember it as a xerophyte the best, than by only seeing a picture of it. In Figure 3.1 a pyramid is shown of the different media that can be used in biology, as suggested by Allers and Cawood. Different media, especially in biology are classified from classes 1 to 6. Class 1 is the best to reach the outcomes of OBE, as they can see, touch and smell the live biota and it is more concrete, while class 6 is more abstract and the learners will have difficulties to understand.

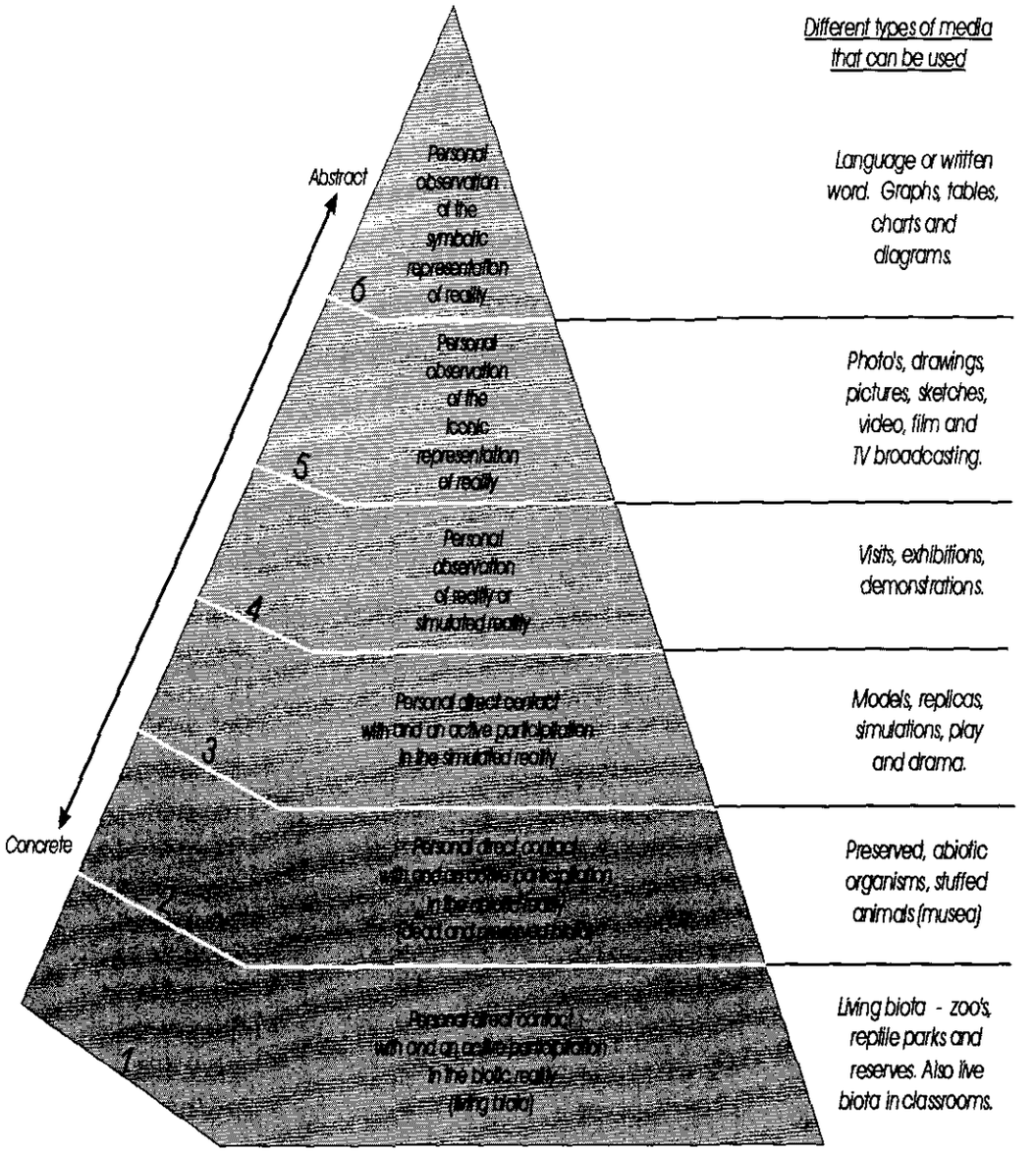


Figure 3.1 A pyramid of different media as used in Biology (Allers, 1995:82; Cawood *et al.*, 1982:195).

Some of the media that can be used will be discussed with the relevant advantages and disadvantages. Media such as live biota, preserved materials, excursions, computer based articles and reference works, as well as audio-visual media will be looked into. Teachers should make use of the best media for what must be achieved in a specific lesson. They should follow the golden rule of Gerlach *et al.* (1980:141) that states that a medium of instruction must be selected on the basis of its potential for implementing an objective. "A

good aid is like a window, it should not call attention to itself, and it should just let the light in" (Reznich, 1993: 1).

3.2.1 CLASS 1 - LIVE BIOTA

Live biota includes the real, living animal or plant material. Live biota can be kept in the classroom or in captivity. An aquarium with fish or a terrarium with termites can be kept in the classroom. Even mice or snakes can be kept in a cage in the classroom. Live biota also includes ecological visits to nature reserves, zoo's or botanical gardens and visits to pet shops.

Advantages:

- By using these media the learners make use of all their senses. They are able to see, hear, smell, touch and even, if possible, taste the live biota. By so doing the learners observe more intensively than by just listening or watching (Allers, 1996:83).

- Learners touch the real object and learning becomes more concrete as learners are actively involved.

Disadvantages:

- There is not always live biota available. And the welfare of animals is a real and legal matter.

- It might be too expensive to keep live animals.

- Visits to nature reserves and botanical gardens are expensive.

3.2.2. CLASS 2 - PRESERVED MATERIAL

Preserved animals such as embryos of sheep, horses, etc. can be kept so that learners may observe it. The learner still has direct contact with the material, but it is not living material,

but the non-living. This is not as effective as the live biota, because not all of the senses are used.

Advantages:

- It is the real thing and can help learners to understand exactly what is meant.
- It can be kept intact for very long periods of time.
- It can be used over and over again.

Disadvantages:

- Learners cannot see movement and the object can loose its colour, texture and form.
- Preserved animals or plants cannot always be removed from the solution it is kept in, as it can have an irritable effect on the learners' eyes or skin (Allers, 1996:86).
- Sometimes it is very difficult or even impossible to obtain exactly what is needed, eg. a human heart.

3.2.3. CLASS 3 - MODELS, SIMULATIONS AND PLAYS

Models are recognisable, three-dimensional objects that have been made to scale to represent actual or existing objects with the purpose to explain or demonstrate the shape, structure and or the functioning thereof. A model of the eye for example can be made with clay, and the different parts of the eye can be made in different colours (Conradie, 1977:22-26).

Simulations and plays are useful where the real situation is simulated, eg. a killing of a endangered species is performed by a group learners. The learners' skills are develop and is according to OBE-context, where learners should be active (Allers, 1996:88).

Advantages:

- Small objects can be enlarged and large objects can be reduced to enhance observation and aid the teaching situation.

- Learners can observe a specie or material that is extinct or very rare to find or that could be dangerous.

Disadvantages:

- Models should be made in such a way so that learners can take them apart and put them together, otherwise it loses its effectiveness.

- Models are difficult to make and can be expensive.

- Examples or ideas to create the models from are not always available.

3.2.4 CLASS 4 - EXCURSIONS AND EXPERIMENTS

According to the OED (1976, 6:362) the meaning of excursion is "journey or ramble with the intention of returning to the starting point; pleasure trip of number of persons". Excursions in a Biology lesson can be of great help for the learner, the boring classroom is exchanged for an exiting trip, the teacher can also learn from being an observer and for some learners it is the only way to go somewhere.

Experiments can be of great value, especially where learners have to distinguish between different types of soil. Each learner collect a handful of soil from his home, make it damp with water and then do the sand-clay test. Roll the soil in a sausage and try to make a circle with it. If it breaks before making a circle it contains more sand than clay and if it makes a circle it contains more clay than soil. This is what OBE is about, learning through experience.

Advantages:

- The experience may help to create something that will be remembered and can be referred to later on.

- Learners are subjected to a different environment as they get a break from the class-room.

Disadvantages:

- During an excursion the learner is only an observer. The learner is usually not directly in contact with the object or animal.

- The only senses that are involved in the learning process are visual and auditory senses.

- As some of the animals and plants are kept in captivity and behind glass, learning becomes less concrete and more abstract.

3.2.5 CLASS 5 - PHOTOS, TRANSPARENCIES, PICTURES, CASETTES, CD-PLAYERS, TV AND VIDEO.

Learners make use of their auditory and visual senses. The learners can see how animals move and hear the sounds they make.

According to Malan (1985:69) teaching-learning media such as the computer, radio, television and video can help to promote interest in the subject and motivate learners to develop some skills.

Advantages:

- Small biota can be enlarged by means of enlarging lenses, microscopes and electron microscopes.

- Large video libraries are available through the local library, SABC (eg. 50/50, and other nature programmes), and other institutions of learning.

- Countless articles and photos out of magazines, journals and other books can be presented to learners about topics such as camouflage, mimicry and other biological phenomena.

Disadvantages:

- Material is sometimes difficult to obtain.

- Materials can be very expensive.

- Materials can be time consuming to obtain and set up before learners can benefit from what is being presented.

3.2.6 CLASS 6 - GRAPHS, TABLES AND DIAGRAMS.

Writing is a method of human intercommunication by means of arbitrary visual marks forming a system (Whiting, 1998). As this is the most basic form of communication and also used the most, it is relevant to make some mention about this method of conveying knowledge. So language, legibility and conciseness is of great importance if the learner is to grasp exactly what is meant.

Advantages:

- Representation of data gathered over extended periods can be clearly shown.

- Relevance of information can also be precisely indicated.

- It can be presented on paper and is cheap to produce.

Disadvantages:

- It is sometimes to abstract for learners to understand easily and requires a lot of explanation.

- It requires a lot of planning and skill to produce if it has to have any real significant value.

3.2.7 THE COMPUTER

There are many educational programmes and internet sites available for the teaching of Biology.

Examples of these are:

- Science in Africa – http://www.scienceinafrica.co.za/education.htm.

- How to use the Internet - http://www.mcli.dist.maricopa.edu/tl/index.html.

- Sharing of educational technology – http://www2.h-net.msu.edu/~edweb/.

- Teaching and learning on the www – http://www.mcli.dist.Maricopa.edu/tl/index.html.

- Multimedia Education Group – http;//www.meg.uct.ac.za/

3.3 EXAMPLES FROM BIOLOGY-TEACHERS (PART OF NS) PORTFOLIO

Examples of how a teacher can present a lesson on a plant cell and an animal cell will be discussed, by making use of transparencies, micrographs and models.

According to Briel (1981:13) and Cole and Chan (1994:93) certain media can only be used for a specific lesson that is why transparencies, micrographs and models were chosen to discuss the plant cell and animal cell.

Micrographs, electron microscope photos, and models were used to produce the images on the following transparencies. Overlay transparencies will also be used to show the differences and similarities between a plant cell and animal cell. The reason for using these specific media is that they are easy to prepare, easy to use, relatively cheap and available to the teacher. Involving the learners with building models from real life micrographs and presentations on transparencies helps develop skills in many ways.

In Figure 3.2 (page 45) a micrograph was taken by a light-microscope of a plant cell and the negative was scanned into the computer, which was then enlarged. A drawing was made to the same scale as the micrograph on the computer. It was then labelled comparing the micrograph and the drawing and a printout was then made and copied onto a transparency to be used in a biology lesson.

In Figure 3.3 (page 46) a TEM-micrograph (Transmission Electron Microscope) of a animal cell was taken. The micrograph of the animal cell is enlarged 11 000 times. The same procedure as for Figure 3.3 was followed to produce the image on a transparency.

In Figure 3.4 (page 47) a plant cell and animal cell representation was reduced on the computer to fit both drawings onto one transparency. The similarities are indicated in the middle of both drawings, and the differences are indicated on the outside of the drawings.

To indicate the differences and similarities between a plant cell and an animal cell each one has to be presented separately, with overlay-transparencies, then both cells can be mounted on a transparency to indicate the similarities and differences. The set of overlays shown in Figure 3.5 (page 48) a plant cell and Figure 3.6 (page 49) an animal cell was drawn on the computer and then enlarged on the computer using Corel 8. Several copies were made of the drawing. Each overlay was "cut" out of one copy of a plant cell, discarding those parts that were unwanted. Each part of the total picture was then mounted on a separate drawing, with a complete copy of the picture, in order to keep everything in alignment. Each new

information on the picture was in a different colour, to highlight the different organelles in the cells. Then each of the mounted part-pictures was run through a photocopier to produce a copy on four transparencies. By making use of overlapping-transparencies the learners will get a much better idea of what is being taught and will form a better visual concept of the issue that is being discussed.

In Figure 3.7 (page 50) the three-dimensional sketch of a plant cell and Figure 3.8 (page 51) the three-dimensional sketch of an animal cell can be used to build a model.

Learners can use polystyrene or model clay to build the model. Learners build the model in a 3-D shape and paint each organelle a different colour, for example the nucleus will be blue, the vacuole will be pink, etc. They can build the model individual or in groups. After completing the model they do a presentation of the model, describing the function of the different organelles. By doing a presentation of the cells they develop their communication skills and become actively involved in the lesson.

3.4 CONCLUSION

Audio-visual media such as transparencies, micrographs, models, etc. were discussed as teaching-learning media. The plant cell and animal cell were used to indicate how these media could be of help to teach biology.

In chapter 4 the empirical study will be looked into. A summary will be made of what type of teaching-learning media Biology teachers are using, what media is available in schools, and why Biology teachers are using that specific media.

A Plant cell

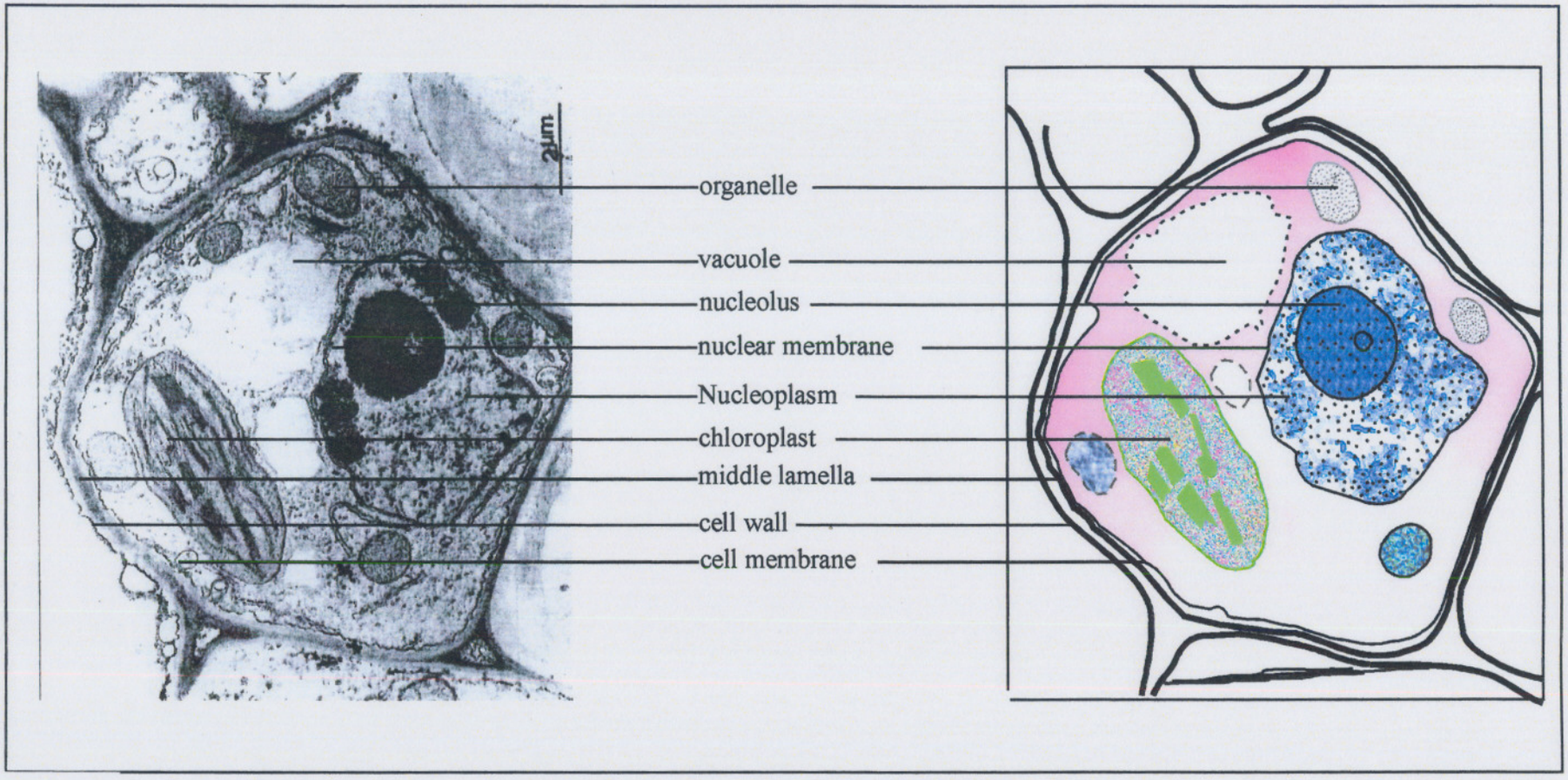


Figure 3.2 A micrograph and schematic representation of a plant cell

(Clitheroe *et. al.* 1988:150)

An animal cell

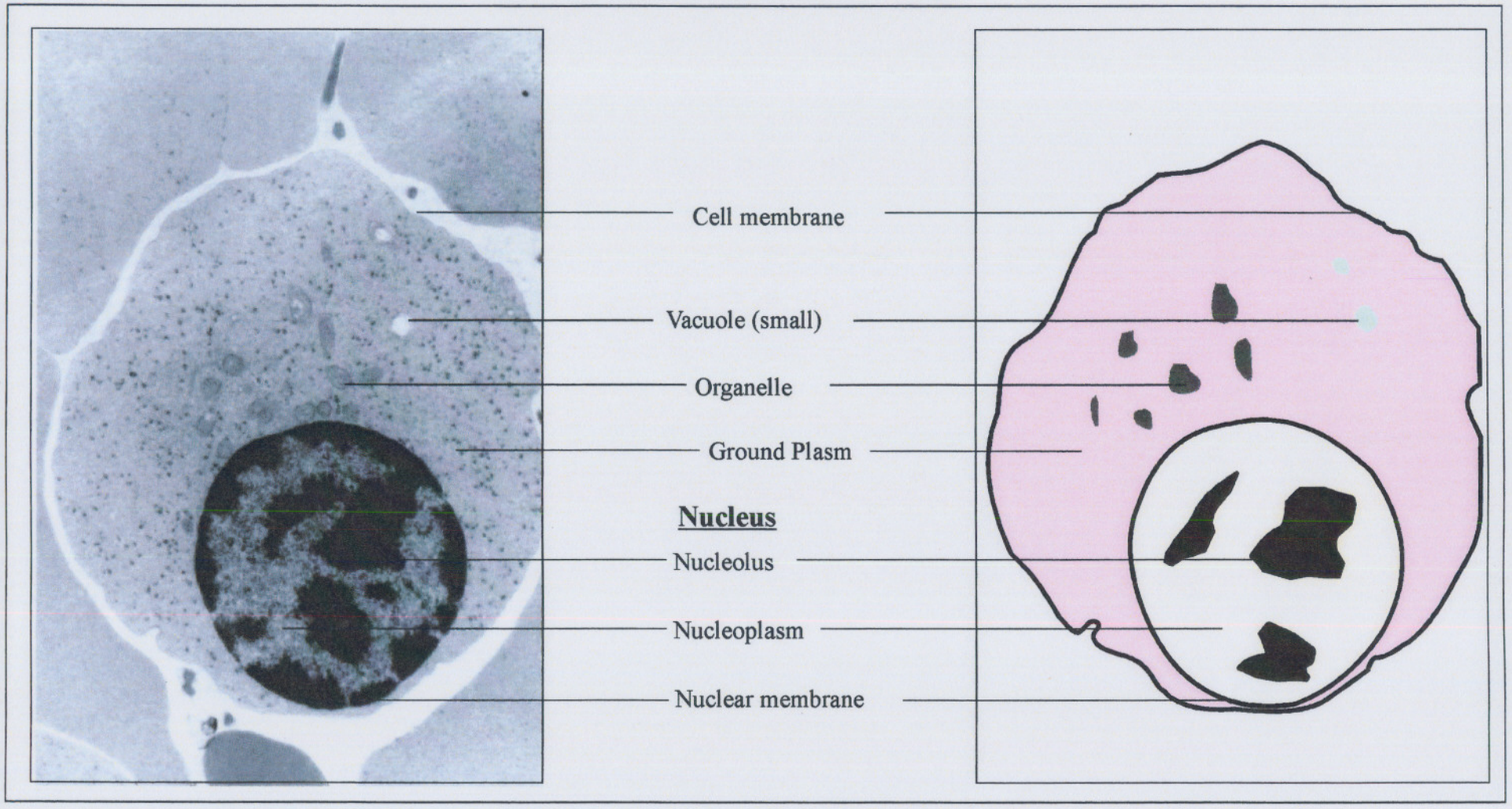


Figure 3.3 A micrograph and schematic representation of an animal cell

(Rogers, 1983:40)

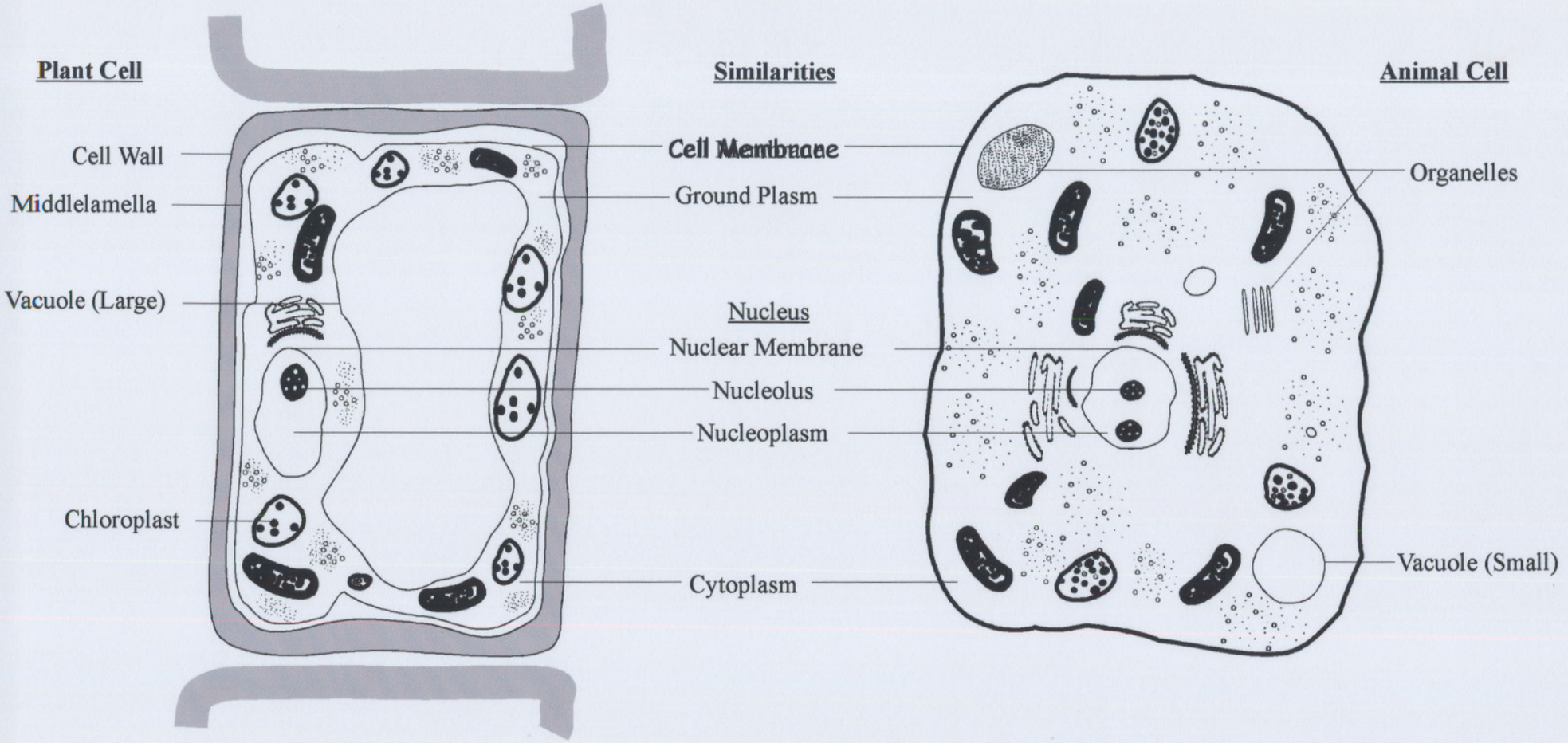
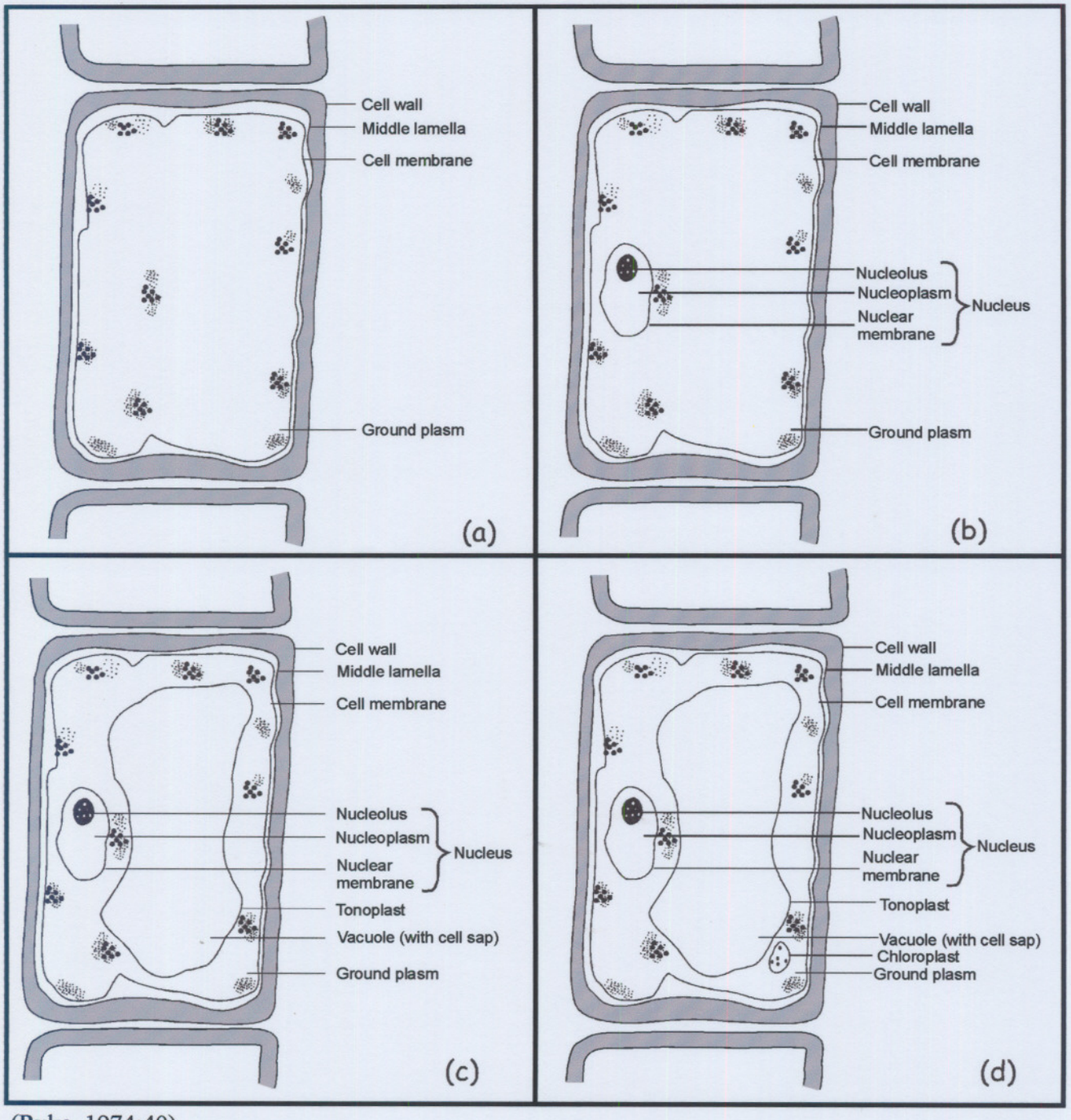


Figure 34 Differences and similarities between animal and plant cells

Figure 3.5 A gradual build up of a plant cell for a class representation



(Ryke, 1974:40)

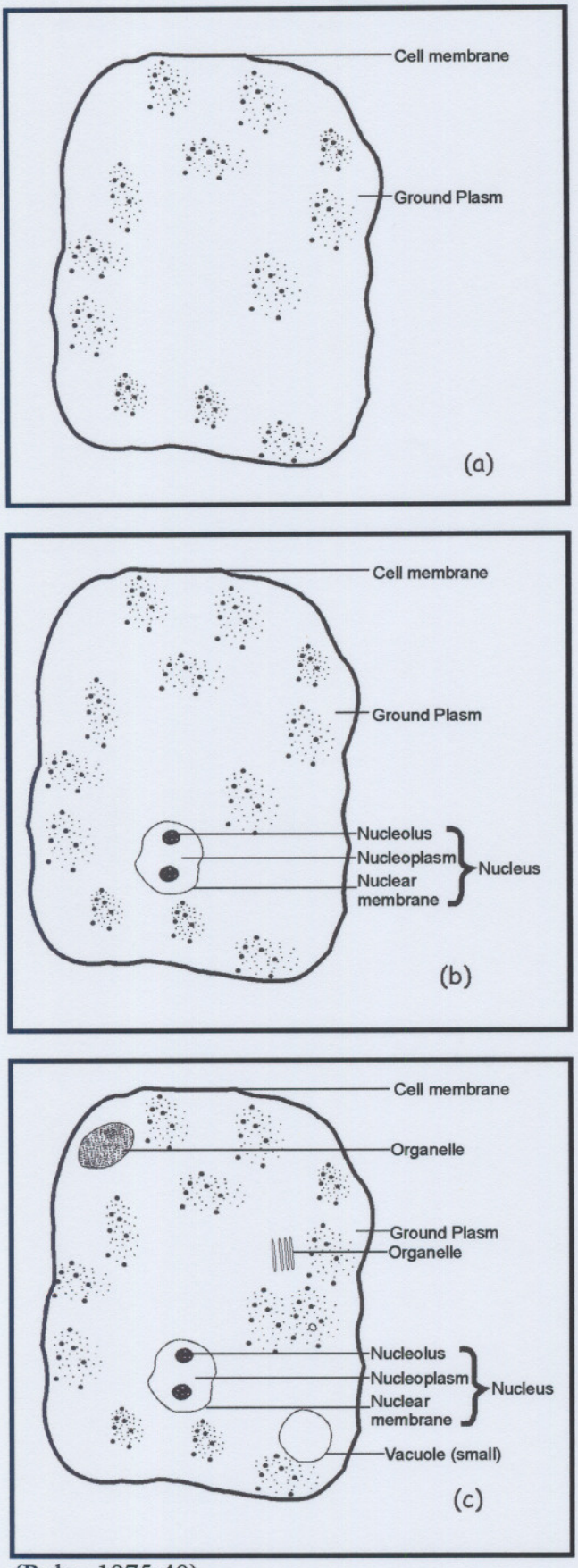
(a) The main shape of the plant cell is presented and discussed.

(b) The nucleus is added and discussed.

(c) The vacuole is added and it and its function is discussed.

(d) The chloroplast is added and its function and importance is discussed.

Figure 3.6 A gradual build up of an animal cell.



(a) The main shape of an animal cell.

Present and discuss.

(b) The nucleus is added and the

function of the nucleus is discussed.

(c) The vacuole and different organelles

are added and discussed.

(Ryke, 1975:40)

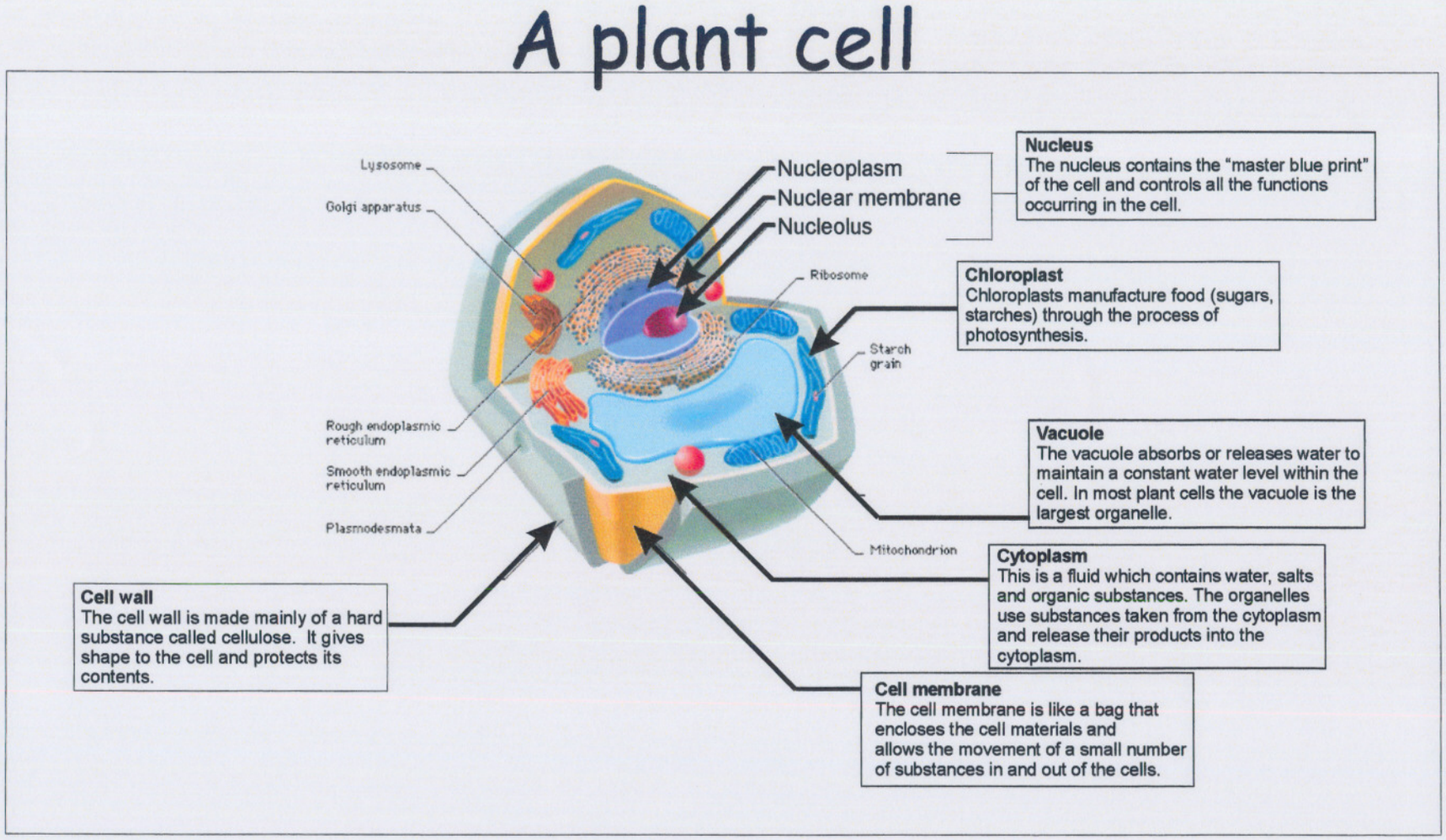


Figure 3.7 A three-dimensional diagrammatical sketch of a plant cell to be used to build a model from.

(Clitheroe *et. al.*, 1988:144-145; Porter, 1988.).

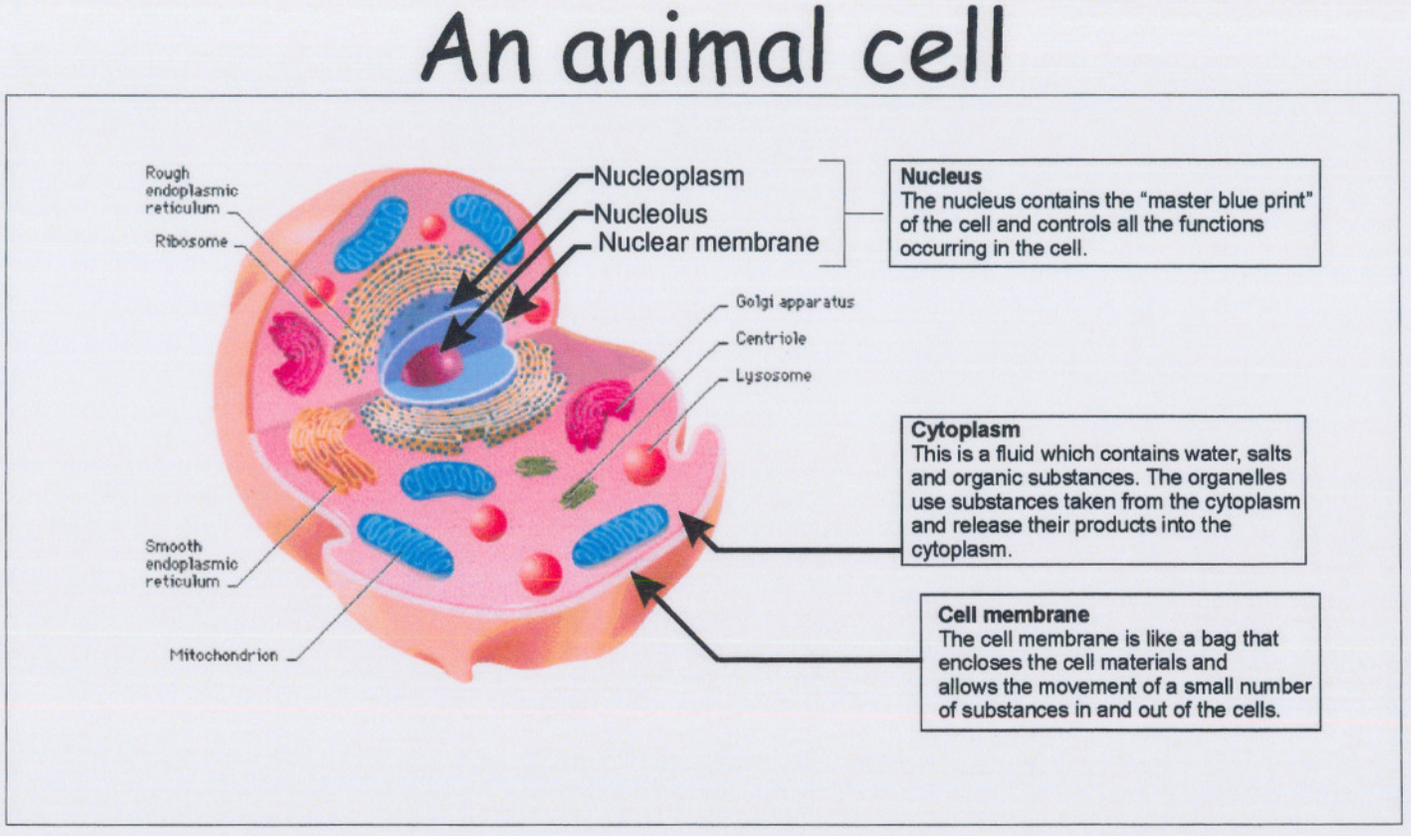


Figure 3.8 A three-dimensional diagrammatical sketch of an animal cell to be used to build a model from.

(Clitheroe *et. al.* , 1988:146-147; Porter, 1988.).

CHAPTER 4

EMPIRICAL STUDY

4.1 INTRODUCTION

In this chapter a description of the method to collect information and the procedure that was followed in designing a structured questionnaire will be given. The literature survey in chapters two and three formed the framework for this research. A questionnaire was used to collect data. This data will be interpreted and analyzed with the help of the Statistical Consulting Services of the North-West University (Potchefstroom Campus).

4.2 AIM OF THE EMPIRICAL STUDY

The aim of this empirical study is to determine what type of media teachers are using to teach Biology as an integral part of NS in the senior phase and why they are using that specific media. If teachers are not using any teaching-learning media, what are the reasons, why they are not using any media and what can be done to provide teaching-learning media where there is not any teaching-learning media available.

4.3 STUDY POPULATION

The target population of this study was teachers teaching Biology as an integral part of NS, in the senior phase in an OBE-system in the Sedibeng-West (D 8) District (Vanderbijlpark). A total of 50 teachers completed the questionnaire. Teachers teaching Biology as part as NS, were having a work session with the department and all of them were used for this research. They represented different schools in the Vanderbijlpark area as well as Sebokeng and Sharpeville.

4.4 THE RESEARCH INSTRUMENT

According to Gall *et al.* (1996:246) the type of questionnaire that is going to be used depends on the purpose of the research. For the purpose of this research a structured, multiple questionnaire was used. This multiple questionnaire was used to save time and it was cost-effective, for it was easy to administer. The researcher made use of a self-administrated questionnaire. According to Bourque (1995:3) a self-administrated questionnaire is completed by a respondent without the presence of the researcher.

The multiple questionnaire was used based on the following assumptions (Wolf, 1997:422):

- "that the respondents can read and understand the questions;
- that the respondents are willing to answer the questions".

Advantages:

Mentz (1990:149) and Hopkins (1993:136) describe the advantages as follows:

- It is more practical and time saving.
- Structured questions simplify the completion of it.
- The unit cost is relative cheap.
- The respondent can complete it on his or her own time.
- A lot of information can be collected in a relative short time.

- All questionnaires are identical, therefore the respondent do not have many external factors that will influence the completion of the questionnaire.

- Respondents remain anonymous, which give them freedom to complete the questionnaire.

Disadvantages:

The use of a questionnaire also has its disadvantages, according to Hopkins (1993:136), Mentz (1990:149) and Smit (1986:13-15), which are:

- It is difficult to determine the reliability of a questionnaire.

- It is difficult to draw up a questionnaire to enable all the respondents to interpret the questions the same.

- Not all the questionnaires that are given out are returned.

- People are sometimes negative to complete a questionnaire.

- Questionnaires are normally anonymous, and therefore make it impersonal.

- Questionnaires are restricted to people that are literate.

- There cannot be a good controll on who completed the questionnaires.

- To draw up a proper questionnaire takes time.

- Respondents do not respond in their own words, because of the multiple-choice questions.

This questionnaire was used because it was time saving and cost saving. Only one questionnaire was drawn up and copies were made, which made it very easy to use. Questions were kept simple so that all respondents could understand it, by just indicating his/her opinion with an X. Teachers are literate people, so there was no problem in reading the questionnaire.

4.5 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT

According to Van der Westhuizen (1979:22) the validity of a measuring instrument (a questionnaire for this research) is one of the most important aspects to determine the value of something. The degree of validity depends on what the purpose of the measuring instrument is, what the researcher wants to achieve (Anastasi, 1980:131). The validity points out that the questionnaire should measure what it is suppose to measure (the aim of the research) and the reliability must point out the accuracy of the data that is collected (Leepy, 1997:32, De Wet *et al.*, 1981:131-145).

The reliability of a measuring instrument will definitely influence the validity of it. The lower the reliability of a measuring instrument, the lower or smaller the validity thereof. A high reliability of a measuring instrument will not assure a high validity of it, because reliability has nothing to do with what the instrument is measuring, it only measures the accuracy of it. A valid questionnaire will also be a reliable questionnaire.

Reliability was tried to obtain by spending time to draw up the questionnaire bearing the following in mind: the type of questions being asked, simplicity, clearness, unambiguousness as well as the relevancy of the questions.

There was no real pilot study done. The questionnaire was presented to colleagues (Biology teachers in the senior phase of OBE) to give comments. Their answers to the questions were controlled to see if these answers corresponded with the answers given by the respondents. In this way it could be seen if the questions were not misunderstood.

4.6 THE DESIGN OF THE QUESTIONNAIRE

Before drawing up a questionnaire there are certain requirements to be followed (Gall *et al.*, 1996:279; Cresswell, 1994;13-30). These requirements are:

- The questions must be of high quality and should be formulated so that all the respondents will be able to understand it. Do not use terminology that the respondents will not understand.

- Questions shouldn't be ambiguous. It should be straightforward.

- The questionnaire should be short and not take too much time to complete. Unnecessary information should be avoided.

- Questions should have a theoretical background and must help with the research.

- If alternative answers are required it should be comprehensive.

- Questionnaire items and pages should be numbered.

The afore-mentioned rules were taken into consideration in formatting the questionnaire. Altogether eight multiple questions were used in this questionnaire (See Annexure B).

According to Smit (1986: 25,26) structured questions are formulated before hand and then the respondent make a choice of answers given to him/her. For this research the respondent has to make a tick opposite the answer he/she prefers, for example,

In what condition are the teaching-learning media at your school?

1. Poor condition (none are working)	
2. Fair condition (some are working)	**X**
3. Good condition (all are working)	

4.6.1 THE COVERING LETTER

Vermeulen (1998:68) and Gall *et al.* (1996:299) emphasize the fact that there should be a letter accompanying the questionnaire. A copy of this letter appears in Annexure A. The covering letter was aimed at orientating the respondents, as well as assuring them of confidentiality and anonymity.

4.6.2 ADMINISTRATIVE PROCEDURES

The questionnaire was distributed personally through the Sedibeng-West District (D8). Biology teachers (teaching the Biology part of NS) from Secondary Schools had a NS workshop at Sebokeng College, where the questionnaires were distributed and collected.

The return rate of the questionnaires was very good because the questionnaires were handed out during the course and collected after completion of the questionnaires. All the questionnaires (50) that were distributed were returned.

4.6.3 PROCESSING OF DATA

A descriptive analysis was done and the data was collected with the aid of a questionnaire. This data was processed by using the SAS-programme in consultation with the Statistical Consulting Services of the North-West University.

4.7 ANALYSIS OF DATA

A total of eight multiple questions were asked to determine what media teachers are using, what the reasons are why they are using that specific learning-teaching media, what can be done to assist them to use different media etc.. A total of fifty (50) teachers completed this questionnaire. These 50 teachers represent a large variety of different schools in the townships as well as the town area. A copy of this questionnaire appears in

Annexure B. The first number in each column is the total of teachers out of 50, and next to the number is the percentage.

QUESTION 1

How often do you use the following teaching-learning media as a Science (Biology) teacher to present your lesson more effectively?

	Never	Seldom (once a month)	Often (once a week)	Every Lesson
1. Chalkboard	4 = **8 %**	0 = **0 %**	7 = **14 %**	39 = **78%**
2. Transparency	21 = **42 %**	17 = **34 %**	8 = **16 %**	4 = **8 %**
3. Video/ slides/ TV	25 = **50 %**	0 = **0 %**	20 = **40 %**	5 = **10 %**
4. Radio/ Cassette/ CD	38 = **76 %**	10 = **20 %**	1 = **2 %**	1 = **2 %**
5. Computer/ Internet	35 = **70 %**	8 = **16 %**	2 = **4 %**	5 = **10 %**
6. Textbooks	5 = **10 %**	7 = **14 %**	13 = **26 %**	25 = **50 %**
7. Flashcards/ Posters	11 = **22 %**	10 = **20 %**	17 = **34 %**	12 = **24 %**
8. Excursions	30 = **60 %**	17 = **34 %**	2 = **4 %**	1 = **2 %**
9. Models	14 = **28 %**	15 = **30 %**	16 = **32 %**	5 = **10 %**
10. Live Biota	41 = **82 %**	4 = **8 %**	4 = **8 %**	1 = **2 %**
11. Plays/ simulations	23 = **46 %**	15 = **30 %**	10 = **20 %**	2 = **4 %**
12. Experiments	13 = **26 %**	12 = **24 %**	22 = **44 %**	3 = **6 %**

Table 4.1 Data on what teaching-learning media teachers are using.

The teaching-learning media that is most often used are the chalkboard, textbooks, posters and flashcards. Live biota, the computer, radio and cassettes are not likely to be used by teachers. Teachers feel more comfortable to use media such as the chalkboard and textbooks, for there is no specific skill requirement necessary, as there is for using the computer for example.

QUESTION 2

Why are you using the specific teaching-learning media that you use often / in every lesson .

1. Cost saving	15 = **30 %**
2. Time-saving	24 = **48 %**
3. Easy available	40 = **80 %**
4. Effective for learning	39 = **78 %**
5. User friendly	26 = **52 %**

Table 4.2 Data on why teachers are using certain teaching-learning media.

Most teachers are using teaching-learning media that is easily available and effective for learning. Only 30 % of the teachers said that they use certain teaching-learning media because it is saving them money.

QUESTION 3

Why are you not using those media that you have indicated as "never or seldom" more often.

1. Too expensive	20 = **40 %**
2. Take too much time	12 = **24 %**
3. Not available	45 = **90 %**
4. Not effective	4 = **8 %**
5. Don't feel comfortable with it	3 = **6 %**

Table 4.3 Data on why teachers are **not** using certain teaching-learning media.

Most of the teachers (90 %) are not using certain teaching-learning media, because the media is not always available. Most of the teachers feel comfortable with the media that they are using, only 6 % don't use a specific media which they will have difficulties to operate, eg. using the internet. Some teaching-learning media is too expensive to buy or to use, therefore 40 % of the teachers are not using teaching-learning media that is too expensive.

QUESTION 4

Which of the following teaching-learning media do you have available at your school ?

1. Chalkboard	50 = **100 %**
2. Transparency	27 = **54 %**
3. Video	34 = **68 %**
4. Radio	18 = **36 %**
5. Computer/ Internet	21 = **42 %**
6. Textbooks	40 = **80 %**
7. Flashcards/ Posters	28 = **56 %**
8. Models	29 = **58 %**
9. Live biota	7 = **14 %**
10. Slides	11 = **22 %**
11. TV	36 = **72 %**
12. Cassettes	16 = **32 %**
13. CD's	7 = **14 %**

Table 4.4 Data on which teaching-learning media is available in schools.

According to table 4.4 all schools have a chalkboard in the Biology class, and most schools (80 %) have textbooks. Many schools have got a television (72 %) and a video machine (68 %). Teaching-learning media which is not available in many schools are live biota and CD's (only 14 %).

QUESTION 5

In what condition are the teaching-learning media at your school ?

1. Poor condition	8 = **16 %**
2. Fair condition	28 = **56 %**
3. Good condition	14 = **28 %**
4. Not available	6 = **12 %**

Table 4.5 Data on the condition of teaching-learning media in schools.

According to table 4.5 the condition of teaching-learning media in schools are in a fair condition. Teachers are able to use the media in their schools to present a lesson.

QUESTION 6

To what effect do you think teaching-learning media play a role in the effective presentation of a lesson ?

Large	Medium	Small
40 = **80 %**	9 = **18 %**	1 = **2 %**

Table 4.6 Data on the role teaching-learning media plays in presenting a lesson.

According to table 4.6 most teachers agree (80 %) that teaching-learning media plays an important role in presenting a lesson effectively. Only 2 % is of the opinion that teaching-learning media plays a small role in presenting a lesson effectively.

QUESTION 7

Which of the following teaching-learning media would you say is user-friendly (easy for the teacher to use) ?

1. Chalkboard	49 = **98 %**
2. Transparency	42 = **84 %**
3. Video/ slides/ TV	38 = **76 %**
4. Radio/ Cassette/ CD	29 = **58 %**
5. Computer/ Internet	27 = **54 %**
6. Textbooks	36 = **72 %**
7. Flashcards/ Posters	28 = **56 %**
8. Excursions	25 = **50 %**
9. Models	32 = **64 %**

10. Live Biota	12 = **24 %**
11. Plays/ simulations	16 = **32 %**
12. Experiments	34 = **68 %**

Table 4.7 Data on which teaching-learning media is user friendly.

According to table 4.7 teachers consider the chalkboard (98 %) as the most user-friendly teaching-learning media, and then the transparency (84 %). Teaching-learning media which they don't consider to be very user-friendly are live biota (24 %) and plays or simulations (only 32 %).

QUESTION 8

What do you as a teacher feel should be done about the teaching learning media problem in schools? Please indicate your opinion by ticking the appropriate block (s).

1. The Department should give more attention and money to solve the problem.	29 = **58 %**
2. Schools should solve the problem internally.	11 = **22 %**
3. An exchange program should be established amongst schools.	22 = **44 %**
4. There should be a central institution to address this problem and aid teachers. (private initiative ?)	23 = **46 %**
4. Teachers should be trained to create and make their own teaching- learning media (computer / arts / creativity courses)	38 = **76 %**

Table 4.8 Data on what should be done to solve the teaching-learning media problem.

According to data collected in table 4.8, teachers feel that there should be training courses where they can create their own media and get guidance in how to operate certain teaching-learning media.

OPEN QUESTION: At the end of the questionnaire space was provided for any comments. The following comments were made:

- There are too many learners in a class, at present 40+ learners per class.
- There are discipline problems, especially in large classes.
- That each district should present courses to train teachers to use teaching-learning media.

4.8 CONCLUSION

This chapter presented the analysis and interpretation of the research results. Most respondents are still making use of the traditional teaching-learning media such as the chalkboard and textbooks. According to the OBE-system, and especially teaching Biology, this is not the correct way of teaching, but because of a lack of funds and media equipment teachers make the best of what is available. They are using these teaching-learning media as they are easy available, effective for learning and user-friendly.

Another finding of the empirical study is that the respondents feel that teaching-learning media plays an important role in presenting a lesson effectively.

There was also the revelation that respondents feel that teachers should be sent on courses, where they can be taught how to use certain teaching-learning media, and how to create their own teaching-learning media.

In the next chapter the summary, findings and recommendations will be presented.

CHAPTER 5

SUMMARY, FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter comprises a summary of the research project described in the previous chapters. The main aim of this study was to determine which teaching-learning media teachers are using and why they are using certain teaching-learning media in a Biology class as part of NS in the senior phase of OBE. This research also aimed to determine what can be done to help teachers to use different teaching-learning media. A literature survey was conducted to determine what types of teaching-learning media can be used, the classification of teaching-learning media by media specialists and factors that need to be considered before choosing a specific teaching-learning media.

5.2 SUMMARY

The first chapter outlined the rationale of the study. The study focused on what type of teaching-learning media teachers are using and why they are using that specific teaching-learning media. In this chapter the problem was stated (see 1.2), aims were set (1.4) and the design was briefly outlined (1.5).

The purpose of the literature study, in chapter 2, was to introduce the different types of teaching-learning media, as well as the advantages and disadvantages of these media, that can be used in presenting a lesson, such as the chalkboard (2.5.2), transparencies (2.5.3), television, video's and slides (2.5.4), the radio, cassette and cd-player (2.5.5), charts, diagrams, pictures and posters (2.5.6), models (2.5.7), and the computer (2.8). The views of different media specialists were discussed, such as Ellington (2.3.1), Marais (2.3.2), Romiszowski (2.3.3), Gerlach (2.3.4), Schramm (2.3.50 and Coger (2.3.6). According to them teaching-learning media is classified into visual, audio-visual, audio, computer-based, excursions and the real thing.

Also in this chapter the factors that need to be considered before choosing a teaching-learning media were discussed (2.4). Factors such as the developing levels of the learners (2.4.1), the nature and complexity of the subject (2.4.2), the instructional method (2.4.3), the communicative properties of the media (2.4.4), the availability (2.4.5) and the costs of the media (2.4.6) should be taken into consideration before choosing any teaching-learning media.

The third chapter illustrated how some of the teaching-learning media, that were discussed in chapter 2, can be used in a Biology lesson (3.2). The best teaching-learning media to use in a Biology class would be live biota (3.2.1), where the learners can see, touch and smell the real thing. Preserved material (3.2.2), models (3.2.3), excursions (3.2.4), pictures and transparencies (3.2.5), graphs and diagrams (3.2.6), plays/simulations (3.2.3), experiments(3.2.4) and the computer (3.2.7) are also of great assistance in teaching Biology.

This led to the teaching-learning media examples that were used to illustrated a plant cell and an animal cell. Transparencies of a plant cell (Figure 3.2 and 3.4), and transparencies of an animal cell (Figure 3.3 and 3.4) have been drawn up to indicate the use of the transparencies. Overlay-transparencies were created of a plant cell (Figure 3.5) and an animal cell (Figure 3.6), to indicate how overlay-transparencies can be used. Also sketches of a plant cell and an animal cell were used to indicate how to build models out of polystyrene (Figures 3.7 and 3.8).

The fourth chapter presented the data analysis and interpretation by means of tables representing the views of the respondents (4.7). A self-structured questionnaire was used as the research instrument and the advantages and disadvantages of such a questionnaire (4.4) were presented in this chapter.

5.3 FINDINGS

5.3.1 FINDINGS WITH REGARD TO THE LITERATURE STUDY

The following findings came to the fore after the literature overview in chapter two.

- To present any lesson effectively, teaching-learning media should be used.
- Learners learn the best by hearing and seeing and doing, by making use of live biota.

- Teaching-learning media can be classified into visual, audio and audio-visual media.

- Visual media includes the chalkboard, textbooks, transparencies, posters, pictures, graphs and diagrams, where the written word or picture is only seen.

- Audio media includes the radio, cassettes and cd-player, where learners only hear the information and create their own image in their minds.

- Audio-visual media includes the television, video, experiments, slides, plays/simulations and computer-based programs, where learners can see and hear the information.

- Before choosing a teaching-learning media the developmental level, the nature and complexity of the subject, the instructional method, availability and cost should be considered.

- To present a lesson effectively in OBE-classes, any media where learners can use their initiative will be effective. Learners build their own models, posters or diagrams and then do a presentation using their models to explain a certain topic. Don't underestimate learners initiative and creativity.

5.3.2 FINDINGS WITH REGARD TO THE EMPIRICAL STUDY

The following findings with regard the empirical study were considered:

- Teachers still make use of the traditional teaching-learning media, such as the chalkboard (78%) and textbooks (50%), as indicated in Table 4.1.

- Teaching-learning media like excursions, radios, live biota and simulations/plays are not very often used by teachers (Table 4.1).

- Teachers make use of teaching-learning media that is easily available and effective for learning (Table 4.2).

- The reason why teachers are not making use of specific teaching-learning media, like computers, is because that the media are not available at their schools (Table 4.3).

- The chalkboard and textbooks are available in almost all schools (Table 4.4).

- Teachers are not making use of live biota, because it is not available at their schools (Table 4.4).

- Most teachers (80%) indicated that teaching-learning media plays an important role in teaching (Table 4.6)

- The condition of some teaching-learning media in schools are in a fair condition,like textbooks and chalkboards, which means it can still be used by teachers (Table 4.5).

- The chalkboard, transparency and textbook are considered as user friendly and that is why these three are used frequently most (Table 4.7).

- There is a need amongst teachers that there should be courses available where teachers can be instructed on how to use certain teaching-learning media, like the computer and internet, and where they can be trained to create their own teaching-learning media (Table 4.8).

- If teachers want to apply OBE properly, they have to use other teaching-learning media as well, and not only the chalkboard, textbooks and posters. According to Table 3.1 OBE is not applied as it should be.

5.4 RECOMMENDATIONS

The aim of this research was to investigate different teaching-learning media teachers are using to present a OBE-lesson effectively in the Biology class as part of NS.. Furthermore to look what can be done to improve the use of teaching-learning media. In order to do so, a literature study was undertaken which served as the foundation on which the empirical study could be based. The findings of this research are incorporated in the following recommendations:

- Tertiary institutions should offer courses, included in the training of teachers, on how to create their own teaching-learning media and to use more advanced teaching-learning media like the computer and power point.

- Schools should arrange for workshops at schools, where courses in the use of teaching-learning media can be presented.

- Learners can assist in creating teaching-learning media, like building models and making posters, which at the same time develop their investigation and creativity skills.

- In OBE-classes, the teacher can make use of any teaching-learning media to communicate (for example information in magazines, internet or newspapers), and not only make use of the traditional teaching-learning media, such as the chalkboard and textbook.

In the light of possible limitations in this research, the following suggestion for further research is made:

- Research should be conducted and courses should be developed to train teachers in how to create their own teaching-learning media and how to use more advanced teaching-learning media especially in teaching Biology as part of NS.

5.5 CONCLUSION

This study indicated that teachers are still making use of the traditional teaching-learning media like the chalkboard and textbooks. They are not making use of the more advanced media such as the computer or Power Point, either they do not know how to use it, or it is not available at their schools. There is a need for courses, where teachers can be trained in how to use the more advanced teaching-learning media.

Teaching-learning media play an important role in teaching Biology as part of NS in OBE. Without such media teaching remains teacher-centred and not learner-centred. By making use of media such as experiments, plays/simulations and excursions learners are actively involved and learn to think critically. By making use of live biota (stick insects) learners can connect it to real-life situations (put it back in tree).

It is hoped that the suggestion and recommendations made in this study will help to provide teachers with more information on how to use teaching-learning media more effectively, so that the learners can benefit by understanding the information presented to them. Although OBE is based on specific outcomes and SKVA (skills, knowledge, values and attitudes) of the learners, the teacher is still the facilitator and has to explain difficult concepts.

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ANNEXURE A

LETTER ACCOMPANYING QUESTIONNAIRE

August 2004

Dear Colleague

EMPIRICAL RESEARCH ON TEACHING-LEARNING MEDIA

I am currently busy with my M.Ed-studies at the University of the North-West (Potchefstroom Campus). My research has to do with :

The teaching-learning media Biology (NS) teachers are using in presenting their lessons.

You are kindly requested to assist with this research by completing the questionnaire that is attached.

All completed questionnaires will be treated confidential and anonymous.

The questionnaire consists out of multiple choice questions and you can answer it by indicating it with a X next to your choice.

I want to thank you for your willingness to be of help in this regard.

Kind Regards

ANNEXURE B

QUESTIONAIRE

Teachers want to present a lesson effectively to learners. Sometimes information is difficult to understand and then teachers make use of **teaching-learning media** to make it easier for learners to understand. Teaching-learning media that can be used are:

- Live biota
- Audio (radio cassettes, cd-players)
- Visual (chalkboard flashcards, transparencies)
- Teletype (computer)
- Excursions
- Demonstrations
- Simulations
- Audio-visual(TV, video, slides)

PLEASE ANSWER BY MAKING A TICK IN THE APPROPRIATE COLUMN.

QUESTION 1

How often do you use the following teaching-learning media as a Biology (NS) teacher to present your lesson more effectively ?

	Never	Seldom (once a month)	Often (once a week)	Every Lesson
1. Chalkboard				
2. Transparency				
3. Video/ slides/ TV				
4. Radio/ Cassette/ CD				

5. Computer/ Internet				
6. Textbooks				
7. Flashcards/ Posters				
8. Excursions				
9. Models				
10. Live Biota				
11. Plays/ simulations				
12. Experiments				
13. Other (Specify please)				

QUESTION 2

Why are you using the specific teaching-learning media that you use often / in every lesson?

1. Cost saving	
2. Time-saving	
3. Easy available	
4. Effective for learning	
5. User friendly	
6. Other (Please specify)	

QUESTION 3

Why are you not using those media that you have indicated as "never or seldom" more often?

1. Too expensive	
2. Take too much time	
3. Not available	
4. Not effective	

5. Don't feel comfortable with it	
6. Other (Please specify)	

QUESTION 4

Which of the following teaching-learning media do you have available at your school ?

1. Chalkboard	
2. Transparency	
3. Video	
4. Radio	
5. Computer/ Internet	
6. Textbooks	
7. Flashcards/ Posters	
8. Models	
9. Live biota	
10. Slides	
11. TV	
12. Cassettes	
13. CD's	
14. Other (Please specify)	

QUESTION 5

In what condition are the teaching-learning media at your school ?

1. Poor condition	
2. Fair condition	
3. Good condition	
4. Not available	
5. Other (Please specify)	

QUESTION 6

To what effect do you think teaching-learning media play a role in the effective presentation of a lesson ?

Large	Medium	Small	None

QUESTION 7

Which of the following teaching-learning media would you say is user-friendly (easy for the teacher to use) ?

1. Chalkboard	
2. Transparency	
3. Video/ slides/ TV	
4. Radio/ Cassette/ CD	
5. Computer/ Internet	
6. Textbooks	
7. Flashcards/ Posters	
8. Excursions	
9. Models	
10. Live Biota	
11. Plays/ simulations	
12. Experiments	
13. Other (Specify please)	

QUESTION 8

What do you as a teacher feel should be done about the teaching learning media problem in schools? Please indicate your opinion by ticking the appropriate block (s).

1. The Department should give more attention and money to solve the problem.	
2. Schools should solve the problem internally.	
3. An exchange program should be established amongst schools.	
4. There should be a central institution to address this problem and aid teachers. (private initiative ?)	
5. Teachers should be trained to create and make their own teaching learning aids (computer / arts / creativity courses)	
6. Other (Please specify)	

Note:

Any ideas, remarks or comments by teachers would be appreciated. Any such idea, remark or comment should be written in the space provided hereafter. Your cooperation is much appreciated.

Question	Idea, remark or comment

School: _____

Learning Area: _____

Grade: _____