

EFFECTS OF ROBINSON'S SQ3R AND SUMMARIZATION TECHNIQUES
IN IMPROVING COMPREHENSION AMONG SOME SECONDARY SCHOOL
STUDENTS

BY

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DEDICATION

To God Almighty,

the invincible pillar of support throughout
my life, especially during a recent
psychological thunderstorm from which it
pleased Him to blow me safely ashore;

To My Loving Children -

Adeorike, Adesola, Adefolarin, Oyebade
and Babajide -

with whom it has pleased God to complement
my life;

And to All

**those who would endeavour to help these
children**

in their life struggle.

ABSTRACT

Poor comprehension ability was identified as an instance of poor study habits leading to under-achievement. The study investigated the effectiveness of Robinson's SQ3R and Summarization study techniques in improving students' comprehension ability. The effects of the two strategies on students' attitudes to their subjects were also investigated.

One hundred and forty-four JSS III Nigerian students drawn from two secondary schools in Ibadan were exposed to the treatment programmes. A 3 x 3 factorial design was adopted with the treatment and control groups occupying the rows and the three levels of mental ability - high, medium, and low - occupying the columns.

Three instruments comprising the following were used:

1. Raven's Standard Progressive Matrices
2. Comprehension Tests
 - (a) English Comprehension test, based on passages from "Faster Reading For Better Comprehension" by Dr. S.O. Ayodele, modified and validated by

the experimenter.

(b) Biology Comprehension test, designed and validated by the experimenter.

3. Attitude test: A slight modification of Aiken and Dreger's 1963 Attitude Scale (revised by Akinboye, 1974) was used to measure subjects' attitudes to (i) English Comprehension (ii) Biology.

The data obtained were analyzed, using the Analysis of Covariance (ANCOVA), and t-test derived from the use of the Least Mean Squares and the Standard Error of Means.

The six hypotheses tested and the results obtained were:

(i) There will be no significant difference in the comprehension ability of the treated subjects and the control. This hypothesis was rejected as the treated subjects performed better in English Comprehension ($F = 20.56$; $Df\ 4/135$; $P < 0.05$). The result also reported statistically significant differences in the columns ($F = 19.14$; $Df\ 2/135$; $P < 0.001$) and significant interaction ($F = 12.35$; $Df\ 4/135$; $P < 0.05$). This indicated that the mental ability of subjects was an important factor in the results obtained.

(ii) There will be no significant difference in the Biology

comprehension ability of the treated subjects and the control. This hypothesis was rejected: the treated subjects were superior in Biology comprehension ($F = 41.77$; $Df 2/135$; $P < 0.01$). Here, too, the interaction between the rows and the columns was significant ($F = 9.61$; $Df 4/135$; $P < 0.05$).

- (iii) There will be no significant difference in the attitudes to English Comprehension and Biology of treated and untreated subjects. The test of this hypothesis revealed that the two treated groups exhibited better attitudes to English Comprehension and Biology than those in the control group ($F = 10.96$; $Df 4/135$; $P < 0.5$).
- (iv) There will be no significant difference in the English Comprehension ability of subjects exposed to SQ3R and those exposed to Summarization. The results showed that the SQ3R group performed better in English Comprehension than the Summarization group ($t = 9.89$; $Df = 94$; $P < .001$).
- (v) There will be no significant difference in the Biology Comprehension of the SQ3R and Summarization groups. The results showed that the Summarization group scored higher in Biology Comprehension than the SQ3R group ($t = 5.11$; $Df = 94$; $P < 0.001$).

(iv) There will be no significant difference in the attitudes to English Comprehension and Biology of the SQ3R and Summarization groups. This hypothesis, too, was rejected: The SQ3R group exhibited better attitudes to English Comprehension and Biology than the Summarization group ($t = 3.63$; $df = 94$; $P < 0.001$).

Generally, the results of this study showed that students comprehension ability can be fostered if they are exposed to some useful techniques. Their attitudes to the academic subjects can also be improved. The educational implications of the findings were discussed, and some suggestions were made.

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CERTIFICATION

I certify that this work was carried out by Mrs. Paulina Oluremi Adesemowo (nee Saibu-Odueko) in the Department of Guidance and Counselling, University of Ibadan, Ibadan:



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CHAPTER ONE
PROBLEM AND BACKGROUND

A. INTRODUCTION

Poor performance in schools is a pervasive problem in the schools settings. This problem is also of great concern to educational counselling psychologists who are specifically charged with the duty of helping students to maximize achievement and realize their potentialities to the fullest. In Nigeria, poor performance of students is usually a topical issue and a perennial problem plaguing the educational system. The increasing number of students failing school certificate examination is another validation of the above observation. The 1985/86 West African School Certificate (WASC) result recording 70% failure was the worst in forty-four years. Ojo (1987) observed that 70% of the respondents who filled his questionnaire rated Nigerian public schools as "only fair"; and 60% of the pupils in the schools can be classified as low achievers (Dada, 1986).

In the Universities, the cases of low GPA, repetition, withdrawal, or even expulsion are all very common. This high drop-out rate and mass failure at important examinations have been associated with 'the brain-fag syndrome' in Nigerian students (Prince, 1960). Bakare (1986) categorized

the causes of poor academic performance into four major classes: Causes resident in the society, the school, the family and the child. He (Bakare) differentiated between academic failure and poor academic performance: academic failure refers to performance falling below a specified standard or pass mark while poor academic performance refers to performance that falls below a desired standard. The problem is enormous because many Nigerian students are affected by either poor academic performance or academic failure.

A glance at the consequences of poor educational achievement generally convinces one of the need to help students achieve better results. To the students, failing courses or repeating the same class has some negative implications. It leads to a waste of time and money and the impact of the unrealizable goal can be psychologically weighty. Failure brings untold hardship and frustration to the individual (Vabaza, 1974). Frustration causes a person's behaviour to become less flexible, less constructive and imaginative and the person can react by withdrawing, compromising or being aggressive (Shaffer and Shoben, 1956).

Parents, usually entertain high anxiety about their children's academic performance (Hall, 1982). Literate parents want their children to perform well academically as they are very anxious to keep the flag of enlightenment flying in their family. Illiterate parents, on the other hand, cherish good academic performance to ensure that their children do not miss the golden opportunity which they themselves missed. Poor educational performance, therefore, affects the home and parents whose hope of gaining upward social mobility for their children through education become shattered. Some parents react by nagging and making negative comparisons with other children. After the secondary school education, many parents pay heavily for children to receive special coaching before they can acquire the necessary qualification for university admission. Such parental anxiety about their children's placement explains the die-hard patronage which many parents give to continuing Education centres.

Some instances of examination malpractices have been traced to poor academic performance. Students who could not perform well and yet wanted to pass various examination had resorted to cheating and other examination atrocities.

The adverse effect of students' poor academic performance does not end with the individuals alone. The nation's political, economic, and social developments are jeopardized. As Denga (1985/6) observed, the yearly attrition of hundreds of students from the Nigerian universities due to poor academic performance has resulted in the wastage of scarce and human material resources. Drawing the link between education and economic life, Morakinyo (1984) opined that educational failure is economic failure. The National Policy on Education (1977, revised in 1981) recognizes "education as a dynamic instrument of change" and states inter alia:

"The Federal Government of Nigeria has adopted education as an instrument par excellence for effecting national development" p.3.

A nation is only as strong as the quality of its individuals. "No nation is greater than the individuals that make it up." (Mueller, 1974). The rigour and the challenges of modern day science, technology, politics, and social activities demand some intellectual capacity. To improve the nation's man-power quality, steps should be taken to maximize educational attainment and improve the youths' academic achievement.

Factors affecting school achievement include parents' socio-economic status, family size, aspirations of both parents and children, and characteristics of the child such as ability, motivation and some personal traits, e.g. laziness, lack of concentration etc. (Banks & Finlayson, 1973). The home makes a great contribution towards the academic performance of the child. The strong relationship between the home, the school, and the academic achievement of the child has been established (Douglas, 1964; Lacey, 1970). Another important factor to consider in school achievement is the students' aspiration or motivation towards learning. Exploring students' achievement motivation; Olive and Douglas (1973) noted that the will to succeed is an important element in achievement. Many students possess high aspiration even though this can only be measured relatively and not absolutely (Turner, 1964).

Students' poor academic performance is commonly attributed to:

- (i) Poor teaching methods
- (ii) Lack of adequate instructional materials
- (iii) Lack of motivation for learning, more so in these days of unemployment.

- (iv) Laziness on the part of the students.
- (v) Inadequate provision of material needs for the students.
- (vi) Lack of commitment and dedication on the part of the students.
- (vii) Inadequate guidance and counselling.

A major cause of underachievement is poor study habits. A brilliant student can underachieve if he has faulty study habits. Studying high school drop-outs, Elliot et al (1966) found that those who drop out of school have the requisite ability to pass. In an attempt to determine the reasons for academic failure, Miller (1962) came up with eleven reasons listed by under-achieving students who placed 'Poor Study Habit' first. Yet, schools generally do not make any provision for any formal instructional programme on Study Improvement. Armbruster and Gubbrandsen (1986) concluded that a lack of direct instructions on how to read and study for content frustrate students' attempt to understand what they read and that teachers often believe that students already know how to read and study for comprehension.

In the Nigerian context, study improvement programmes are hardly talked of. Akinboye (1980) observed:

"It is often assumed that all students are able to study without any aid, once they have competent teachers in schools. Consequently, institutions have totally neglected any deliberate attempts to guide their students in the very important strategies of studying and acquiring knowledge in the various subject areas."

The present experiment forms part of the effort to call attention to this lapse in our educational system: the need to incorporate study improvement sessions in the school programme.

Students should be trained to realize that study should be undertaken formally with maximum effort, tempo and intensity, expended in a conducive environment with no distraction. A causal relationship exists between time spent on home work and academic achievement (Johnson, 1985, Igbalajobi, 1989). The conclusion can therefore be drawn that if students are exposed to effective study techniques they will be able to use the time spent on study and assignment more fruitfully, and better academic performance will be enhanced. Many students handle their study in an informal, carefree and slipshod manner, giving it short-lived attention,

On-the-spot comprehension is hardly achieved let alone recall of the material during examination. The result, therefore, is under-achievement.

Maddox (1963) suggested that for students to work effectively on their own, the pre-requisites are: strong sustenance of interest in their work and a wise use of their time. He further stressed that the common difficulty in study is failure to get down to real concentrated work. In Anderson and Armbruster's (1984) opinion, a successful student has two basic tasks:

- (i) to focus attention on important information in the text.
- (ii) to engage in an appropriate encoding activity i.e. to think about, organize, or rehearse information in a way that will enhance good test performance.

There is a need to draw a distinction between under-achievement and low achievement. The underachieving child is one whose actual achievement, as indicated by his scholastic attainment in school, does not measure up to his potential achievement as indicated by his abilities (Naylor, 1972). However, with the low achiever, his actual low achievement measures up to his low potential and abilities. Courses and curricular programmes developed for

the low achiever are usually remedial, and evidence shows that majority of such students fail to complete such remedial courses satisfactorily, and they are doomed to failure, or forced to terminate their education (Roueche and Hurlburt, 1968). On the other hand, many of the underachievers are of high intellectual ability (Chopra, 1967); they are just not achieving up to their maximum potential because of some other variables militating against their efforts. The present study focusses on the remediation of one of such variables: inefficient study habits.

Training students in the use of efficient study skills will not only improve their academic performance, it will also enhance better psychological and sociological state. This borders on the relationship between the psychological and sociological realms of school achievement. A boy who does badly academically is predisposed to reject the school system which has placed him in an inferior position, and in extreme situations, an anti-school culture may develop (Lacey, 1970). Also much work has been done relating some personality traits to academic achievement (Eysenck, 1972; Everett, 1971). Oakland (1969) found some correlates of

under-and over-achievement. Over-achievers were better organized and more motivated, co-operative and conformist than under-achievers who tended to be more impulsive, critical, angry, and avoided facing problems.

The present study experimented with the use of study-type reading techniques to improve students' comprehension ability. Reading is of utmost importance because the act of reading is observed to be the corner-stone of fundamental education (Harris, 1962). Moreover,

"Upon his (the student's) reading depends his acquisition of most other classroom subjects. ... inability to read adequately acts as an almost insurmountable obstacle in his attempt at learning academic subjects." (Shimota, 1964 p. 408).

Students' weakness at Reading is borne out by Shuman (1975) who states inter alia:

"The basic fact that parents, administrators, teachers and students must grapple with is that many of today's high school students cannot read well enough to succeed in schools as they are constituted. Regardless of how one defines the teenage poor reader, the compelling fact remains that many of the high school students can deal neither efficiently nor effectively with the printed word, and are virtually shut off from all educational experiences that are predicated upon the ability to read." (p.37).

Ayodele (1989) noted that one of the problems facing secondary school students is their inability to read efficiently

with the result that very many students perform very poorly in the certificate tests of Comprehension and Summary. All these views underscore very sharply the need for students to acquire skilful reading techniques, of which comprehension is a basic component.

Comprehension is very important because:

1. Comprehension is of great importance in the acquisition of knowledge. In Bloom's (1956) taxonomy of educational objectives, after knowledge of facts, comprehension follows: and it is only when comprehension is achieved that application, analysis, synthesis and evaluation can be achieved.
2. Comprehension ensures that the message really passes across and that the correct impact is made in the mind of the reader; it is only when this is achieved that the individual can make his own contribution to the body of knowledge, become creative, and make innovations.
3. Deeper comprehension leads to better recall and the more a student gets a thorough understanding of the lesson, the more he retains essential ideas.
4. Comprehension and rate of reading are closely related

because as comprehension becomes difficult, regressions and small eye span slow down the rate of reading, but as comprehension becomes easier, increased reading span and decreased regression cause the rate to be faster (Robinson, 1940). In fact, the only adequate definition of speed of reading is to consider its rate of comprehension (Tinker, 1940).

5. Reading comprehension ability has been found to be related to self-concept: individuals who had low reading comprehension tended to have low self-concept (Hebert, 1968 and Butkowsky & Willow, 1980). Also, general improvement in reading skills led to improved grades and better self-concept (Gillham, 1967).

There is a need to take students through some study-type reading techniques to improve their study skills and comprehension ability as simple reading and re-reading of passages was found to be ineffective in improving comprehension (Stordahl, 1956; Rothkopf, 1968).

Apart from the general need to reduce academic waste, students should be trained to have maximum outcome from

the efforts expended on their academic work. Merely giving a set of guiding principles to follow on how to carry out their studies cannot yield any lasting dividend. There is a great need to train students consciously to apply effective study techniques to their work in order to maximize outcome especially in the present-day highly competitive Nigerian educational scene. If the achieving student can still face some problems of high cost of education, inadequate educational facilities, scarcity of books, admission rigour, unemployment etc. then the problems will affect the underachiever even more acutely.

It then follows that a high standard of achievement has to be maintained in the face of stringent educational facilities and austere economic conditions. Students will be faced with the academic demand of having much to read and understand within a short time. This spells out the need for the students to acquire effective study techniques which will enhance their academic work. In this experiment, subjects will be exposed to Robinson's (1961) SQ3R, and Summarization study techniques in order to improve their comprehension ability.

Generally, comprehension is badly handled in schools; much of what is usually done represents a reading and questioning session. The type of questions often asked has been researched into by many scholars. Haynes (1935) discovered that 77% of teachers' questions in sixth-grade history classes demanded factual answers and only 17% required students to think. Gall (1970) reached the conclusion that 60% of teachers' questions required students to recall facts, 20% required students to think and the remaining were procedural. Ogunniyi (1981) studied the pattern of questioning of textbooks and Science teachers' instructional style and opined that the textbooks and the teachers who use them asked mostly informational and rhetorical questions.

In the present experiment a step-by-step inculcation of Comprehension techniques will be undertaken to expose the subjects to some basic comprehension skills like text-surveying, self-generated questioning, real concentrated reading, reviewing, locating and writing down of key points etc. Studies known to the present researcher on the use of Summarization to improve comprehension are very scarce. Also, studies reviewed

on the use of the SQ3R technique involved Arts subjects like History, Social Studies and Economics, and researchers often reported difficulty in making subjects acquire the technique (Beneke & Harris, 1972; Bailey, 1988). In the present study, subjects were trained in the use of the SQ3R technique to handle English Comprehension, and Biology, a science subject involving diagrams and illustrations. Efforts were made to incorporate in the study the use of reinforcements and other behaviour modification techniques, directed at inculcating in the subjects self-management, self-monitoring and self-sustenance skills which, it is hoped, will make the acquisition of the two techniques easier.

Briefly, SQ3R is a study technique which demands that, for a student to read and comprehend, he has to go through the five essential steps represented by the abbreviation SQ3R: Survey, Question, Read, Recite, Review.

Training them to use the SQ3R technique has some specific advantages:

- (i) Raising questions or turning the main headings of an assignment passage into questions, which is a step under the technique, helps students to predict examination questions because the headings turned into questions

are usually the points emphasized in examination. The use of the SQ3R technique will ensure better preparation of students for examination. Thus, examination anxiety in students will be greatly reduced.

(ii) Teaching students to generate questions is highly advantageous; students have been known to demonstrate improved comprehension after they were taught to generate their own questions (Singer & Doulan, 1982; Schmitt & Baumann, 1986).

(iii) It stresses important concepts and provides for recitation as "rehearsal" of the performance expected in a test (Beneke and Harris, 1972).

Summarization is also a study technique in which a student reads any study material so thoroughly that he can fish out and write down the important details in the material.

Helping students to acquire the technique of summarization, too, will ensure that:

(i) Students achieve deep understanding as they cannot write a summary of any reading material they do not thoroughly understand.

(ii) Students need to make sensible summary of materials read especially as they read from different sources, at times from the library, and more often than not they do not possess personal copies of some of the books used.

The same educational and academic demands that made the learning of the study techniques imperative also called for the incorporation of some behaviour modification approaches and reinforcement techniques leading to the subjects' acquisition of self-management, self-sustenance and self-monitoring strategies to ensure independent use of the techniques. Other advantages of the behaviour modification approaches are:

(i) They make the acquisition of the techniques very effective and pleasant for the students because learning is usually more effective if the learner is reinforced for any response made (Wagenen, 1963; Rosenfeld, 1972).

(ii) They boost and facilitate students' persistence in acquiring the techniques to the end. Beneke (1972) points out that the major problem in getting subjects to use the SO3R method was that the method requires effort on the part of the subjects and that many subjects

try the SQ3R method but give up because of the effort involved before they learn it well enough to receive the benefit. Such persistence will even be more necessary in training subjects to use Summarization.

(iii) They enhance the permanence of the study skills to be acquired; students show improvement for a longer time when trained to apply self-administered reinforcement (Van Zoost, 1974).

Therefore, the following behaviour modification techniques were used in this study:

Shaping:

Each of the two techniques were broken down into small steps indicating the skills to be inculcated at each step. This ensured thorough mastery of each skill and the eventual acquisition of the techniques. After each skill was successfully completed, it was continuously, consistently, contingently and generously reinforced.

Active Teaching:

The therapist was actively and directly involved in teaching the subjects some comprehension passages

and Biology topics on which the training in the study techniques were based. The Schools' Schemes of work and English Language text were followed. This arrangement made it possible for the therapist to be sufficiently familiar to establish rapport with the subjects who then became more confident to learn the techniques.

Modelling:

The therapist modelled (demonstrated) to the subjects the main actions involved in the two techniques e.g. reading effectively which involves maintaining a conducive environment, clearing the reading table so as to leave only the relevant materials needed for the study, and concentrating at study. Through the modelling, the actions involved became more vivid to the subjects and easy to acquire. Akinboye (1984) posited that modelling is a behaviour change strategy whose major concept is that human behaviour is powerfully influenced by that which he observes, hears, feels, perceives, conceives, creates or participates in.

The vicarious experiences provided to the observer during modelling become stamped in at the acquisition stage when the observer attempts to acquire the behaviour

deficit. Vicarious and direct reinforcement which was applied at each stage helped the acquisition further.

Rehearsal:

The subjects were made to rehearse or perform the actions modelled by the therapist. This performance stage gave the subjects the opportunity of being actively involved in the action. Every manifestation of the desired behaviour by subject was contingently and consistently reinforced by the therapist.

Reinforcement:

A plethora of studies have proved the effectiveness of the use of reinforcement in the acquisition of desired study habit or in classroom instructional situations (D'orazio, 1962; Johnson, 1962, Sechrest, 1963; Chahbasi, 1967; Leather, 1968; Briggs, Tosi & Horley, 1971; Cheyne, 1972 and Akinboye, 1976). Therefore, some forms of reinforcement used in exposing subjects to the use of the two techniques were:

(a) Self reinforcement:

The subjects were trained to make positive self-statements to encourages themselves. A significant gain in study habit was found as a result of self-administered reinforcement (Jackson & Zoost, 1972).

(b) Token reinforcement:

A tick was put beside each correct response given by the subjects. Of particular interest was the increase obtained in appropriate behaviour as students were reinforced for correct work (Hundret, 1976).

(c) Social (Verbal) Reinforcement:

Subjects were rewarded with pleasant remarks indicating approval when they took any correct step. Tosi, Upshaw, Lande and Waldron (1971) observed significant mean gain in clients' classroom response as a result of the social reinforcement awarded.

(d) Feedback:

Subjects were told their performance i.e. they were fed back with the result of their previous performance to serve as encouragement for further action. Subjects provided with knowledge of results after answering a section did much better than when the feedback was not given (Fraser, 1967; Rucinski, 1968; Anderson et al, 1972; and Synder, 1972).

ATTITUDE:

The study also found out if subjects' attitude toward their academic subjects improved as a result of

the newly acquired study techniques. It was assumed that the behaviour modification approach used, in its self-management-enhancing capacity, would lead to improved attitudes, in that attitude helps to determine the extent to which the learner will be disposed to acquire a specific learning task. Attitude also determines the encounters, difficulties and frustration experienced by the individual in the attempt to learn (Bloom, 1976). For example, the attitude which an individual has influences, to a considerable degree, his learning of science and his use of the scientific information (Hasan & Billeh, 1975). Oyetunde (1986) stressed the importance of knowing the attitude students hold toward school subjects because people learn more easily and remember longer materials that are consistent with their attitudes. Oyetunde explained further that the teacher needs to go beyond merely knowing students' attitude toward the subjects; he should also know the extent to which their attitude relates to their achievement in the subjects so that predictions and manipulations can be made.

Results of studies have shown that better attitude to the study of a subject leads to improved academic

performance (Maykovich, 1967; Elish, 1968). Investigating students' attitudes towards education and how the attitudes related to their academic and psychosocial problems in the learning process, Morakinyo (1978) found that negative attitudes towards education are related to poor academic performance and poor psychosocial adjustment in schools. King-Fun (1964) and Lunn (1972) contended that students who possessed favourable attitude toward a school subject achieved better than students with poorer attitudes.

OBJECTIVES OF THE STUDY:

This study sets out to achieve the following objectives:

- (i) To improve subjects' study habits and consequently improve their academic performance.
- (ii) To help subjects improve their comprehension ability so as to make reading and learning more positive.
- (iii) To improve subjects' attitude towards their academic subjects and thereby enhance positive disposition towards these academic subjects.

(iv) To experiment with the two study skills (SQ3R and Summatization) so as to know the effectiveness of each in bringing about desired improvement in students' study techniques and in enhancing better productivity.

SIGNIFICANCE OF THE STUDY:

The adverse effects of underachievement for the students, the parents and the nation have been discussed earlier in this write-up. With deficient study techniques, students expend a lot of time and energy on their studies, yet make little achievement. The present study's focus on two study techniques to enhance comprehension will increase students' output at their studies. Such positive improvement will reinforce the students to work harder still.

Psychologically, improved performance will enhance the underachiever's self-concept (Bruck and Bodwin, 1962; Gillham, 1967 and Jones, 1968). The importance of positive self-concept in a student's life cannot be over-emphasised. He feels more confident and better disposed to tackle his academic work and strives to try his best. Tyler (1956) pointed out a definite

relationship between personality factor and scholastic achievement.

Improved academic achievement will also improve students' social adjustment. There exists a significant difference in the degree of academic achievement between groups of well-adjusted and poorly adjusted school children (Norman, 1959, Semler, 1960). When a child is underachieving, it is evident not only in the grade or test scores he receives but also in his broader social functioning (Swift, 1970). Improved social adjustment can enhance better academic performance still: the student will have better social relationship with his classmates and teachers. He will be better disposed to discuss with them and ask for help if he needs any. Akinade (1982) studied the influence of peer group on performance and found that social acceptability, adjustment to school environment and self acceptance affect academic performance.

Moreover, improved performance on the part of the students will act as positive feedback for the teachers who will be further encouraged to do more meaningful work and be more helpful to their students. This has

some advantages for discipline and the tone of the school since successful boys are pre-disposed to accept the culture of the school (Lacey, 1970).

If students' performance improve, parents will worry less and spend less money on coaching, school fees, and admission forms. The placement of such students will be easier.

Improving students' comprehension ability, which is the particular focus of this study, has far-reaching advantages for the individual and the nation. With better comprehension, communication will be improved as students will find the reading of newspaper, instructions, directions, and advertisements more meaningful. Deep understanding enhances critical thinking and judgement leading to objectivity and creativity. Increased harmony, productivity, and continued peaceful co-existence in the society of literates cannot be divorced from the level of reading with comprehension which the individuals of that society can do.

The study will call attention to the need to improve the comprehension ability of students and the proper way to teach comprehension skills. The importance of mounting study improvement programmes as a necessary complement to the secondary school curriculum will be highlighted.

(B) LITERATURE REVIEW

This study considered the improvement of study techniques as a means of solving the problem of underachievement. Therefore, literature (theoretical and empirical) were reviewed on Achievement and Underachievement, and on Study Skills. Comprehension, which was the main aspect of the study skills fostered, was equally reviewed. Literature was also reviewed on the two techniques to which subjects were exposed: the SQ3R and Summarization techniques. Since subjects' attitudes were considered in the study, literature on attitudes were also looked into.

In effect, literature was reviewed on:

- (i) Factors in Academic Achievement and Underachievement
- (ii) Study skills
- (iii) Reading and Reading Comprehension
- (iv) The SQ3R Study Technique
- (v) Summarization
- (vi) Attitudes

THEORETICAL BACKGROUND

Factors in Academic Achievement and Underachievement

Underachievement comes under the category of what

Naylor (1972) referred to as "discrepant achievement," that is achievement which does not coincide with expectations or predictions based on ability. Gowon (1964) has written extensively on Underachievement and he proposed that 15% underachievement among gifted students should be regarded as "normal" experience; he held that the incidence of underachievement among potentially superior students is one of the critical, unresolved educational and social issues.

Reviewing the relationship between some personality traits and discrepant achievement, Taylor (1964) came up with seven traits which were related to achievement:

- (i) the underachiever has more anxiety than the overachiever who has more self-control and is able to direct his anxiety to constructive ends;
- (ii) the underachiever has negative feeling;
- (iii) the underachiever lacks conformity to authority;
- (iv) the underachiever is less concerned with social acceptance and tends to have somehow negative relations with peers;

(v) the underachiever tends to have more conflict over issues concerning dependence and independence than the overachiever;

(vi) the underachiever is socially rather than academically oriented in his activities;

(vii) the underachiever is less realistic in his choice of goals than the underachiever;

Maury(1973) contended that the underachievers often are difficult clients for counsellors because of their impulsivity. However, the underachiever should be viewed in relation to his self-concept. This was probably why Byrne (1982) concluded that self-concept is a multi-dimensional construct having one general factor and several specific facets, of which academic self-concept is one. In Stenner's (1976) opinion, one explanation for the relationship between self-concept and achievement is that self-concept scores are a realistic introspective assessment of a child's intellectual capabilities; and Rogers (1969) regarded a psychologically well-adjusted self as a necessary condition for the development of competence in the educational sphere. Lecky (1945) was

one of the earlier researchers to suggest that scholastic performance tended to be consistent with the individual's self-assessment.

Taylor (1964) further opined that, to a significant extent, underachievement appears to be a function of the students' attitude toward himself, and in his review of researches on underachievement, he concluded that the value a child places upon his own worth affects his academic performance. In Pottebaum's view, children's feelings about themselves are key factors in school achievement. The close relationship between underachievement and self-concept was upheld by Bruck and Bodwin (1962), Gillham (1967), and Jones (1968). In fact, a healthy self-concept leading to an increase in the individual's desire and ability to perform in school, is an essential component of motivation to achieve (McClelland 1951, McClelland, 1953, and Atkinson, 1966).

The issue of achievement motivation is an important one to consider here. Amalaha (1974) defined achievement motivation as that form of human motivation dealing

specifically with achievement, an underlying personality characteristic which involves a learned predisposition to attain success in competition. He further defined academic achievement motivation as the aspect of need achievement motivation which relates specifically to school achievement:

"It is the motive to explore, manipulate, organise and provide the impetus for learning about important features of the school as a specific environment (Amalaha, 1974, p. 28).

Adkins and Ballif (1967) proposed five essential components of achievement motivation: affective, conceptual, purposive, instrumental and evaluative; it was hypothesized that the interaction of these five covert response conditions results in behaviour indicating motivation to achieve and the enhancement of any single element will result in higher achievement motivation once the other elements are present to some degree. In a summary of need achievement (achievement motivation) McClelland (1961) indicated that persons high in achievement motivation take moderate risks in performing challenging tasks where skill is involved, and that they get and use as much concrete feed-back as possible when approaching a challenge; they also seek out ways, take

innovative actions and appear to search out active positions of responsibility where they can feel that their individual efforts in either group or personal goal-directed activity will make a difference. Infact, some writers have reached the conclusion that highly motivated subjects perform better academically than those with low motivation (Rosen, 1956; Cox 1962; Ruhland et al 1978; Bridgerman and Shipman, 1978 and Komolafe, 1981). Crandall et al (1960) held that parents are highly influential in shaping their children's achievement values, standards, expectations and behaviours.

Bakare (1986) analyzed the factors causing poor academic performance in Nigeria into four main groups. The first group covers the factors resident in the society: inequitable distribution of resources, ethnic conflict, conformity to authority, superstition, respect for people rather than ideas. Disillusionment, disorientation and confusion in academic achievement striving may emanate from such conflicting socio-cultural background. The School-related factors constitute the second group; these include poor location of schools, poor building, strained inter-relationship between the human elements in the school, inadequate facilities in the

school due to poor financing, poor standard of teaching and inadequate curricula.

The third group of factors, causing poor performance according to Bakare, include factors in the home, which may affect the physical well-being of the child such as malnutrition, exposure to diseases, protein deficiency and birth complications. Other aspects of the factors resident in the home are the relationship between father and others: child and parents, the sibling relationship, discipline at home, exposure of the child to religious or political prejudice and lack of cognitive stimulation. Factors resident in the child himself constitute the fourth group, and they include physical problems like physical deformities, damage to a sensory organ, brain damage, emotional factors including various psycho-social problems, and intellectual problems relating directly to the academic behaviour of the child.

Study Skills

Okoye (1981), defined study as a systematic, conscious task of acquiring specific knowledge items geared towards a set of standard. It has been established in many write-ups on study skills that study is hard work demanding whole-hearted

attention in order to achieve success. In Akinboye's (1980) view:

"Studying involves doing something about the academic assignment, settling to the study assignment, concentrating, learning, absorbing the facts, coding and reorganizing the fact in the thought system so that one can recall the relevant facts as answers to certain questions in important examinations" p. 1

This explains why Okoye (1981) further held that study should be seen as an active process, and effective study is determined by psychological as well as physical factors. According to Okoye, the psychological determinants of effective study include the totality of the individual make-up: his personality, intelligence, attitudes, interest, aspiration, perceptual abilities, life style, physical health, level of concentration and determination, and the physical factors are study accommodation, sitting arrangement, books, writing materials and study conditions.

Holtzman (1969) observed that there are wide variations in the methods of studying typically practised by students; these variations involve certain aspects of study: the time of day preferred, the time lapse between study sessions, the degree of noise or music tolerated or invited as background, the physical conditions of study, the extent to

which extra-curricular activities interfere and the particular study mechanics employed. Holtzman then concluded that "many study habits appear detrimental to efficient learning whereas others seem to facilitate it". Consequently, Brown's (1940/41) view that many failing students had poor study habits and that they could improve their scholarship by improving their study habits is still particularly true today.

Akinboye (1974) listed common study problems: lack of attention, lack of perseverance on study, day dreaming, worries, anxiety and delusions, over-studying, intensely painful negative feelings towards study and perception of study as restrictive and terribly burdensome; he (Akinoye) then opined that these are personal problems, generally refractory to treatment and for which mere advice cannot help. An analysis of the most effective procedures of improving study skills showed that students do not learn automatically, they need guidance and directions before they can engage in using the skills (Berg, 1966). There is little wonder then for Krumboltz & Farquhar's (1957) suggestion that instructors in study skills courses need to ensure that their students not only

learn about effective methods of study but that they actually apply these methods and acquire attitudes conducive to good study.

Efforts have been made to help students acquire effective study skills by designing some study techniques and mnemonics which, if followed diligently, should aid comprehension and recall. Some of the techniques are reviewed here.

(i) Robinson's 1941, revised (1961) SQ3R:

Since the present study experiments with this technique, an extensive review of the SQ3R technique will come up later in this thesis. Briefly, however, SQ3R refers to a five-step study technique involving Survey, Question, Read, Recite and Review.

(ii) Pauk's (1962) OK4R:

The OK4R is a study-type reading technique with each letter standing for a step. 'O' stands for Overview, and the reader is required to look through the pages of each chapter. 'K'; the second step stands for 'Key points' in which the reader selects the key points of the chapter after skimming to find the topic sentences and key words

and raising questions about them. The 'R' is third step and it stands for 'Read'; the reader is expected to do the actual reading. The second 'R', the fourth step, calls on the Reader to 'Recite' what he has learned. The third 'R' which constitutes the fifth step requires the reader to 'Reflect' on all the points, questions, and facts he has read. 'R', which is the sixth and last step, stands for 'Review' or 'Revise'. Unoh (1969) suggested that Pauk's OK4R is an extension of Robinson's SQ3R.

(iii) Tussing's (1962) PAT:

This is a three-stage study formula. 'P' represents 'Pre-viewing' which involves skimming through an assignment and taking note of distinct ideas. 'A' stands for 'Attacking' which requires the reader to read actively, underlining and jotting down salient points. 'T' represents 'Testing', the third step which involves self-evaluation of the section read by asking questions and discussing with mates.

(iv) Unoh's (1969) 3S3R (SSSRRR):

The first 'S' in this formula stands for 'Survey' and it is the same as 'Survey' or 'Over-view' in the SQ3R

and OK4R techniques. However, the reader's survey in this technique should make him discover the key-points, anticipate some relevant questions, and quickly read through the questions at the end of the chapter, if any. The second 'S' represents 'Study-read' during which the reader should read slowly and intensively marking or underlining important points. To ensure maximum understanding, this step can be repeated before the next step. On coming to the third 'S' the reader is expected to 'Speed-read', which involves going over the selection again at a faster speed so as to recognize or identify already understood material and also take care of partially-understood materials. The first 'R' constitutes the fourth step and it stands for 'Recite' just as in the other techniques; here the reader tests his capacity to recall the facts and information he has learned. Note-taking is very essential here. The second 'R' stands for 'Review' and it is the fifth step. The reader goes over the whole selection at a rapid skimming rate. The sixth and final step is indicated by the last 'R' - 'Reflect' during which the reader considers the extent to which he has understood the information read. He also evaluates

the relevance of the facts to examination questions.

(vi) The ERICA (1982) Programme:

ERICA stands for Effective Reading In Content Area: it is one of the most comprehensive plans for improving reading and study skills. It was developed in Brisbane, Australia in 1982 (Reported in Jones, 1988). ERICA has four stages:

- (a) Preparing for reading which may include a structured over-view of a chapter and pointing out key words.
- (b) Thinking through information which may include close activity.
- (c) Extracting and organizing information involving filling in of informational charts to help students organize materials they have read.
- (d) Translating information. Rather than just memorizing facts, students are given time to think through what they have read, possibly discussing it with one another.

(vi) Bailey's (1988) S-RUN:

This is a study tool directed at achieving great comprehension. 'S' stands for 'Survey' or quick overview of

what is read. 'R' represents the next step which involves 'Reading'. One section is read at a time; heading or sub-heading is written down prior to the reading. 'U' stands for 'Underline', The reader is required to underline key ideas or understand the relationship of key ideas to section heading. 'N' represents 'Note-taking', the last stage during which notes are made: the information underlined or understood is written directly underneath the sections heading. This technique has a special advantage: once students read a chapter and take notes this way-they really won't need to read that chapter again since he already has concise notes that list the main and subordinate ideas.

(vii) Simon's (1989) PSRT:

There are four steps involved in this technique: 'P' stands for 'Prepare', the first step during which the teacher provides necessary background information, helps students to identify key concepts and find out what they already know about the key concepts. 'S' represents the second step and it stands for 'Structure' during which the teacher helps students see how text is organized by

preparing and distributing blank, possibly graphic, over-view to the students. The students can be helped to complete part of the blank over-view with information gathered in Step I. In step three, represented by 'R', 'Read', the students read the text. They should read independently, set purposes for reading and complete the over-view. In step four 'T' stands for 'Think' and here the teacher discusses the text, asks students to summarize the text and asks questions that require the students to think about the text.

After making an intensive clinical investigation of students, Tiebout (1943) emphasized the 'lazy students' syndrome' as a primary problem in studying. He opined that four characteristics were common with a number of poor students: a need to rely upon strong and immediate motivations to start studying; a tendency to be governed by strong hedonistic principles; a tendency to have interest of a transitory, impermanent nature; and a deep-seated problem in learning. Tiebout also noted that such students are also characterized by a marked lack of inquisitiveness, interest, and drive for learning in an academic setting.

As part of the efforts to help students improve in their

study habit, Bakare (1970) designed and validated the Study Habit Inventory (SHI), an instrument which easily detects students who have study problems for remediation. Study Habit Inventory is divided into eight sections, each concentrating on major areas of students' study where problems can arise. The major headings focussed upon in SHI are: Home-work and Assignments, Time Allocation, Reading and Note-taking, Study Period Procedures, Concentration, Written Work, Examinations and Teacher Consultation.

Reading and Reading Comprehension

Reading is a basic activity involved in any academic endeavour. Just as the body requires food and exercise in order to function properly, the mind also needs and demands nourishment and stimulation, and when one fails to exercise reading skills the mind tends to disintegrate (Gentile, 1976). According to James (1984), reading efficiency is the key to successful study, hence a student has to be an efficient reader so as to be successful in all his academic endeavours.

To underscore the importance of reading, Strang (1967) opined:

"Reading proficiency is the royal road to knowledge; it is essential to success in all academic subjects. . . . learning depends largely upon one's ability to interpret the printed page accurately and fully" p.4.

Balogun (1972) observed that reading ability is not only an entrance into almost all vocations, it is also the tool with which people can forge ahead in their chosen professions; he held further that, of all the valuable skills which the individual learns in his life time, the ability to read tops the list because it is the most universal and the most generally useful. In Ayodele's (1984) opinion, among the weapons in a learner's armoury for tackling his academic tasks, none is more vital than that of reading. In fact, Katrowitz (1967) saw reading at the secondary school level and at other educational levels as an important means of developing the various attributes.

A strong relationship has been drawn between reading ability and scholastic success by Karlin (1964) who suggested that when no provision is made for achievement by the poor reader that student is eventually frustrated into a miserable state of failure. Borgatta (1968) held that good readers have the tendency to possess a high measure of

acceptance, personal and social adequacy, security, and consistency of self, and that self-concept is an important factor in reading success: a child who believes he cannot read is likely to avoid any opportunity to read and eventually such escape from reading becomes rewarding to him. Many writers' views about the importance of reading to the academic success of students are the same. Perhaps, this further justifies why students should be helped to acquire efficient reading techniques.

The Schema Theory:

The Schema theory explains how information from the text is intergrated with the reader's prior knowledge about the world. Comprehension occurs when there is an interaction between the knowledge a reader already has, schema, and the information on the page. A message is comprehended when the slots in a reader's schemata corresponds with the information in the text and gets intergrated with the information in the reader's mind to form broader schemata which will then be assessed, enriched and modified the next time information about such a subject matter is read (Cunningham, 1980 and Jones, 1982).

It then means that the more the information we already

have to relate new information to, the better the chance for comprehension. The reader then should use his own knowledge to make predictions about any reading task because prediction is a major strategy of mature reading (Swaby, 1980). The basic reading skills of observation, organization and classification can be improved if the gestalt concept is applied, by providing cues, the reader's attention can be directed to the printed page which is the potential field (Fagan, 1969). Unoh (1979) opined that the primary purpose of reading is to gain understanding and insight and the readers should grasp the pattern of what is read as a whole, fit in details, reorganize and assimilate in such a way as to enable them make it part of their own experience.

The Psycho-linguistic Theory:

Unoh's (1976) proposition of the psycho-linguistic theory of reading, is relevant here. Unoh held that reading is essentially a psycho-linguistic process and that effective reading, particularly in higher learning situations, involves not only the processing and interpretation of linguistic cues and symbols but the use of higher mental processes of reasoning, evaluation, imagining,

organizing and problem-solving. He further held that undue emphasis upon the incidental approach to the development of reading skills has contributed greatly to the prevalence of reading difficulties among Nigerians.

Unoh (1977) listed the typical reading problems of students in secondary schools, particularly in Nigeria where English is used as a second language:

- (i) slow reading rate
- (ii) slow comprehension rate
- (iii) difficulty in distinguishing main ideas from relevant or irrelevant details
- (iv) difficulty in reading for gist
- (v) ineffective recall of what is read
- (vi) uncritical reading behaviour
- (vii) difficulty with creative reading
- (viii) difficulty with intensive (study type) reading
- (ix) inadequate vocabulary or word power
- (x) inadequate reading interest.

In Keppel's (1964) view every examination of the problems of our schools and every learning disorder seems to show some association with reading difficulty.

Comprehension, and study-type reading form a major focus of the present study. Academic reading or study-type

reading involves the ability to explore, discover and analyze what is said in books and make adequate use of reference materials (James, 1984). Leady (1963) stressed the importance of establishing the correct reading habits for such academic reading without resorting to regression, that is, the tendency to look back and re-read a phrase or sentence a few seconds after reading it, should be discouraged. One who has formed the habit of regressing will find it difficult to read anything with understanding without having to regress (Unoh, 1969). In his identification of the reading problems typical of secondary school students, Unoh (1980; 1982) again included slow comprehension rate and difficulty with intensive (study type) reading. James (1984) noted that foremost among problem areas are skills related to comprehension ability.

It is therefore very important that one should acquire techniques which will enhance thorough and quick comprehension of what is read because as Longe (1979) noted efficient comprehension is needed for good academic performance. Mackinnon (1981) noted that comprehension is the sine qua non of reading, and ample evidence was provided to support the fact that poor performance in the content areas

such as science, mathematics and industrial arts often stems from the students' failure to comprehend the questions asked or the instruction given rather than poor concept formation (Strang, 1965; Robinson, 1975). Onakaogu (1987) suggested that Use of English in the Universities should be replaced by English for Academic Purpose but he hinted that the whole effort might be impeded if the Nigerian undergraduate does not have the relevant comprehension skills.

Oyetunde (1986) underscored the importance of Comprehension when he opined:

"There can be no doubt that comprehension is the heart of reading.Comprehension is why anyone reads. Reading comprehension is an active, constructive process involving the use of textual cues and the reader's background knowledge to build a model of the author's intended meaning." p.9.

Quandt (1977) quoted by Oyetunde (1986) held that without comprehension, words are only a series of lifeless symbols - which do not communicate and neither produces learning nor add anything useful to the child's life. Comprehension, Quandt concluded, is a primary goal of reading. In Jeremiah's (1988) view, comprehension is not always the result of what we read or hear but of what underlies the

message at the level of deep structure.

Schwartz and Sheff (1975) considered comprehension to be a thinking process where multiple skills are employed in concert. It was believed that reading comprehension is made up of general factors and that the reader who comprehends well in one area of instruction should be able to comprehend similarly in another (Artley, 1943). Fries (1963) posited that reading comprehension is a specific case of language comprehension: apart from decoding, reading comprehension is dependent upon linguistic, conceptual, cognitive and general knowledge abilities. Actually, Goodman (1967) defined comprehension from psycho-linguistic perception as an interaction between language and thought, that is, the individual decodes language to reconstruct meaning.

Narayanaswamy (1972) and Carver (1978) deliberated on what the correct objectives of comprehensions should be and their ideas are similar in content to Unoh's (1979):

- (i) Relating the idea read to previous experiences.
- (ii) Reading to get the main idea of a sentence.
- (iii) Reading to select important details.
- (iv) Reading between lines, drawing inference correctly and anticipating meanings

- (v) Reading to follow printed directions
- (vi) Reading to gain sensory images from materials
- (vii) Reading for sequential order
- (viii) Recognising various types of material and understanding the purpose for which the material is being read.

The methods employed by teachers in teaching comprehension has generated some comments from writers. Rakes and Smith (1987) noted that teachers rely too often upon teacher questions and student responses as a means of "teaching" comprehension. They contended that this approach is more of an assessment than instruction, and that more recent views of teaching comprehension have emphasized such active student involvement in the teaching and learning process as retelling recalling, locating, predicting, summarizing and paraphrasing. Camprell, Kapinus and Wilson (1987) suggested that for effective and efficient reading comprehension students need a full repertoire of strategies from which to draw for a particular reading task. They suggested further that the two strategies employed by skilled comprehenders are text-processing strategies and text-reorganisation strategies.

Oyetunde (1986) held a three-level view of comprehension:

(i) Literal Comprehension:

This involves "reading the lines", that is, the emphasis is on the factual information given the selection. The main task of the reader is to locate main ideas, details, sequence, comparisons, and character traits that are explicitly stated in the passage. It is the ability to recall facts and reproduce, and it is by no means a reliable evidence of comprehension:

(ii) Inferential Comprehension:

This involves reading "between and beyond the lines" To determine the covert meaning of the passage, the reader brings in meanings and reasoning processes. It is a higher level involving identification of causative factors, making inferences from facts and reaching conclusions and generalizations. There is full understanding only when the reader can establish logical connections between and among the ideas in the text and he can express this in an alternate form.

(iii) Critical Comprehension:

This is the highest level of cognitive processing and

it involves evaluation of what is read. The reader passes a judgement about the content of his reading.

With regards to the relationship between speed and comprehension, the fear that comprehension is achieved at the expense of speed is not justified. Actually, speed has been recognized as a function of comprehension because speed is not merely the measure of words per minutes without regard to the thought content (Letson, 1958). Narayanaswamy (1975) opined that the two are so closely interrelated that it is meaningless to talk of speed without reference to comprehension or vice-versa. A particular objective of any reading improvement programme should be the achievement of flexibility in reading, that is the ability to adjust one's rate of reading to suit what one is reading and why one is reading it. Reading speed, Unoh (1982) opined, is reading faster without sacrificing meaning.

Robinson's SQ3R

The SQ3R technique is a high level study skill originated by F.P. Robinson in 1941(revised 1961). Reading of text-books and

subject materials need special skills that will enhance thorough understanding and lasting retention. Since mere reading and re-reading of lessons do not ensure that enough examination-oriented stimulation is derived from any reading material, some skills have been devised to help students make learning more effective and rewarding. The use of questions before, during, or after reading the text (or study material) has been practised. Pre-viewing or skimming through is sometimes encouraged. Underlining, outlining, reciting and reviewing are some of the methods sometimes used.

Some of these methods have been put together by Robinson in formulating his study technique, the SQ3R. SQ3R is an abbreviation representing the steps which the student follows in using the method. The five steps involved in using the technique are described below:

Step 1: Survey:

This involves glancing through the text to discover the core ideas as presented under the main heading, sub-headings, the opening paragraph and the final paragraph. This survey should take only a few minutes and it should be done with inquiry attitude so as to prepare the reader's

mind for the information about to be received. While surveying the text the reader should avoid the temptation of commencing the actual reading at once because a good survey facilitates effective reading

Step II: Question:

The reader then raises questions about the points he has surveyed. Based on the main heading, sub-heading and lead paragraphs, he generates some questions so that in his reading later he keeps his mind open to seek answers to the questions raised. Raising questions this way arouses curiosity and enhances comprehension. It ensures that the student does not just do the reading passively line by line.

It also focuses student's attention on important details because those points on which questions are raised are the ones usually emphasised during examination. Hence, training students to generate questions in this way may amount to training them to predict examination questions. According to Rothkopf (1970) questions are very effective and they differ in how they focus the reader's attention depending on their location: Questions that appear just prior to study material tend to focus reader's attention

on answers to specific questions.

Step III: Read:

The third step is the actual reading of the passage. Having prepared one's mind in Steps I & II, the reader in his reading should actively search for the answer to the questions he has raised. Passively plodding along each line should be avoided. There should be a conscious effort to put one's mind and attention in the reading. The attitude towards the reading of textbooks is quite different from that exhibited towards the reading of fiction where comprehending the reading for that moment is sufficient. The reading of study material demands deep comprehension which is a prerequisite for retention and easy recall.

Step IV: Recite:

After reading the first section the reader is trained to pause, look away from the book and recite what he has read especially the answer to his questions. The reader should overcome the temptation of wanting to read on and on without pausing to recite. The ability to recite is a good indication that he has comprehended the material.

If he cannot recite the material read, he should glance through the section again until he can do so. It is always more effective when reciting to write down points and cue phrases in outline form because it forces the reader to verbalize the answer. It also makes learning more effective because more sensory channels are involved in the learning. Little time and energy should be expended in the note-taking which should be very brief because lengthy notes will disrupt the progress of reading and the flow of thought many be lost.

Robinson contended that pausing for short note-taking after reading a headed section prevents ~~boredom~~ of reading on and on for a long time, and it ensures that the reader alternates period of working at different activities. Such a change of activity ensures efficiency as one starts each new period with zest. Since the breaks are coming at logical places, they do not disrupt students' thinking too much.

However, students differ in the size of the unit of reading material they can comprehend and assimilate at once. When ^{the} material is familiar one can more easily handle longer sections than when it is unfamiliar or difficult. In

addition, students differ in their ability to grasp large ideas. Each reader has a problem then of finding how far he can read before he must pause and reorient himself. If one continues reading straight along the ideas tend to crowd each other out, cause confusion and jeopardize comprehension.

The 'stopping places' should coincide with breaks in thought of the author i.e. at the end of the headed sections. If such headed sections extend over several pages which seem too much for the reader, paragraphing and other cues should be used to find the best places for brief stops in order to check comprehension and re-orient himself to the coming material. A student can train himself to handle larger and larger unit with resulting effectiveness in his work.

Step V: Review:

When the lesson has been read through and recited, the reader now looks over his note to get a bird's eye view of the points under each heading. This should be possible if there has been thorough comprehension. The review should come immediately after the remaining four steps and it should be brief. From the outline, an overall,

easily visualized picture of the materials read should be got. He should recite the main points and the sub-point again and check for accuracy. This will help the reader to see the organization that exists between the various ideas. He will also discover the aspects not yet understood and for which he can refer to the text. All the known ideas will be so much fixed in his mind that retention and recall will be greatly enhanced.

The effectiveness of the SQ3R technique has been proved by some educational psychologists. Anyaegbunam (1979) confirmed the fact that many students who endeavoured to use the SQ3R method of studying gained much from their reading assignments. In Jacobowitz's (1988) opinion an individual who opts to use SQ3R is aware of a somewhat difficult learning task that requires in-depth processing.

Learning theory:

Miller (1956) expressed the view that SQ3R can be strongly supported by a learning theory. The explanation was that since the memory system is limited in how much it can hold, a reader must actively process the material in to ensure understanding and retention in long term memory. The steps of SQ3R are designed to facilitate the

processing of incoming information so that the reader can deal with it effectively (Tadlock 1978). This is why the SQ3R technique is also used to aid memory.

The first step of the SQ3R technique, Survey, gives opportunity for text preview which provides a framework for comprehending a reading selection (Bean, 1989). Ausubel (1960) and Meyer (1975) postulated that students who approach the text, knowing its macrostructure, or gist will have enhanced comprehension in that they have a framework into which they can fit new information. In the same way, the raising of questions (second step of the SQ3R technique) tend to define independently students' purpose for reading and so it helps them to focus on the text and to monitor their learning (Carr, 1987).

The expected effects of higher order self-questions on the comprehension and recall of information have been guided by two theoretical explanations:

(i) Wittrock (1981) held an "active processing" perspective which explained that attention is mobilized to important information in text through the generation of higher order questions which represents greater cognitive effort allocated to central passage information and which should result

in increased comprehension of the targeted important ideas to enhance inferential and higher order understandings.

(ii) In Rickard's and Di Vesta's (1974) view, higher order comprehension activities such as self-questioning induce more thorough processing of text so that effective self-questions enhance not only inferential comprehension but also the recall of specific and verbatim information.

Evidences abound however, that effective exposure of students to the SQ3R technique is usually a difficult task. Here, one should recall Beneke and Harris' (1972) view that the major problem in getting subjects to use the SQ3R technique was that the method requires effort on the part of the subjects and that many subjects try the SQ3R method but give up because of the effort involved before they learn it well enough to receive the benefit.

Another verdict about the technique came from Bailey (1988):

"As a college study skills teacher, I had tried the SQ3R approach in my classroom but without much success. Students were reluctant to try it because they thought it looked difficult and involved too much work. Despite all my encouragement and enthusiasm, my students did not view SQ3R as a viable reading and study skills technique" p. 170.

Summarization

Summarization is another study skill which can improve students' comprehension ability. This is based on the assumption that the ability of students to effectively summarize a study material is an indication of a degree of mastery over, and a thorough understanding of, such material. Uwakwe and Aworh (1989) described summarizing as the process of converting materials written by others into one's own words without distorting the meaning and without copying the author's exact words; it is a process of condensing the essential information from a piece of writing into a unified group of sentences, containing the main ideas of the original selection.

Making a summary helps to improve comprehension (Brown & Day, 1983). Hebb (1964) advanced the force behind the effectiveness of summarization as a study technique. He opined that time is an important factor in the successful assimilation, re-organization and retention of information items. Therefore, activities which promote such re-organization process such as summary writing should result in increased learning. Conversely, tasks which direct the learner away from the reorganization process

should interfere with effective learning.

A Summary is an attempt to capture all of the information or message in a succinct manner and obtain the specific contents of the message through details at the deep level of meaning (Jeremiah, 1988). Jeremiah noted further that students have difficulty in extracting the core of the reading material because they usually injected specifics in their attempts to summarize. Summaries, as Uwakwe (1984) pointed out, serve as an abridged or shortened form of text material, and the various activities involved in summarizing ensure that the study task becomes part and parcel of the learner because such characteristic active involvement which the students engage in when summarizing makes comprehension imminent, and thus retention and recall will be enhanced. Perhaps, this is the more reason why efforts should be intensified to train students to summarize effectively.

Many secondary school readers, however, are unaware of basic techniques, such as identifying key ideas, and which is basic to summarizing (Carr & Ogle, 1987). Within the Nigerian context, Unoh (1982) identified as one of the reading problems typical of secondary school students, the

difficulty in distinguishing main ideas from relevant or irrelevant details and difficulty in reading for gist and making good summaries. However, not much is known about the way to develop summarization skills in students (Taylor 1983). Taylor's observation about difficulty in developing summarization skills is also true of the Nigerian situation.

Summary writing, according to Oyetunde (1982), entails an interplay of some major skills: ability to identify the main ideas of paragraphs, ability to identify sentences, ability to use synonyms, ability to paraphrase and rephrase, and ability to identify paragraph formats or structure. During guided reading activities students should be led to summarize at various points, evaluate, make new predictions, and relate new information to prior knowledge (Schmitt & Braumann, 1986). Pearson (1985) warned that in summarizing initially the teacher must guide the students in the various activities, but gradually students should assume responsibility for them. This realization justifies the inclusion of self-monitoring skills in the present study.

Literature on summarization is rather scanty and summarization programmes vary from individual to individual. However,

summarization programmes of Gilbert (1966), Schiller et al (1972) and Kintsch & Dijk (1978) will be reviewed next. Gilbert (1966) proposed three steps in summarizing:

1. Read the passage intensively
2. Look for the key points

3. Then formulate a concise statement which gives the essence of the discussion. He further warned that statements that are either too broad or too narrow should be avoided. A statement is too narrow if it fails to include all the essential ideas of the original passage. It is too broad if it goes beyond the limits of the original and over-states the meaning.

Schiller et al's (1972) programme for effective summarization also involves three steps:

1. Read and underline.
2. Use the five 'W's' i.e. Who? What? When? Where? Why? to classify the information underlined.
3. Shape the summary lead into polished form by arranging the ideas and revising the write-up.

All the 'W's' may occur or just some of them, whatever the writer feels necessary to write the summary. Accurate and important information should be included.

Kintsch & Van Dijk (1978) presented the following macro-rules for summarization:

- (a) Delete trivia
- (b) Delete redundancies
- (c) Substitute a super-ordinate for a list of items
- (d) Substitute a super-ordinate for a list of actions
- (e) Select a topic sentence, if one is available
- (f) Invent a topic sentence, if none is available.

Based on Gilbert, Schiller, and Kintsch & Van Dijk's programmes cited above, this writer formulates the following five steps for effective summarization in this experiment:

1. Pre-view the Passage:

Quickly skim through the passage to see the heading and the sub-headings; briefly note the length of the passage and have a rough idea of how many paragraphs it contains.

2. Read intensively and underline the important words:

This is the actual intensive and undisturbed reading of the material. It should be done with wrapt attention and the reader should underline the key words as he comes across them.

3. Search for the key points:

The underlining done in Step II help focus readers' attention on the key points which should be jotted down in a concise form.

4. Formulate concise statements with the key points:

These statements should be precise and direct to point. There is no need to write full sentences as too many words make the summary long, time-consuming and boring.

5. Glance through the passage again:

This is to ensure that all the main points in the passage have been included.

Attitudes

An attitude is not behaviour or something that a person does but it is a preparation for behaviour, and a predisposition to respond in a particular way toward the attitude object (Oskamp, 1977).

To Fishbein and Ajzen (1975) attitude is:

"a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" p.6.

Krech et al (1962) refer to attitudes as the enduring systems

of positive or negative evaluations, emotional feelings and pro or con action tendencies with respect to social objects. According to Buchkin (1970), determinants of attitudes include genetic factors, the person's physiological state, his direct experience with the object of attitude, the social institutions to which the individual belongs, and the specific persuasive communications to which he is exposed. Attitudes have cognitive, affective and behavioural components. The cognitive component consists of the ideas and beliefs which the attitude holder has about the attitude object. The affective (emotional) component refers to the feelings and emotions one has towards the object. The behavioural component consists of one's action tendencies toward the object.

Two view-points on the three components have been presented:

(i) Krech et al (1962) favour the tripetite view and state that there is a "moderately high" relationship between the cognitive, affective and behavioural components of attitude.

(ii) Fishbein and Ajzen's (1972) view-point does not require a necessary connection between the belief, affects

and behavioural intentions; strong relationship only exists under certain conditions.

Attitudes are intrinsically evaluative since the positive - negative dimension toward an object can usually be determined. In structure, attitudes have valence and complexity. The valence of an attitude is the degree of favourability or unfavourability of the person's feelings toward the object. In essence, the present study will measure the valence of students' attitude toward English Comprehension and Biology so that at post-treatment the attitude will be measured again to see if there has been any change in valence, positively or negatively, as a result of the treatment given. Complexity of an attitude refers to the number of elements which it contains, its multiplexity, how very simple or complex the attitude is.

In Morse and Wingo's (1962) opinion, attitudes are among the most difficult learnings for a teacher to foster and develop. This is because there are two dimensions in the relationship between a person's attitudes and his life pattern:

- (1) Attitudes are embedded in other personality traits; they are needed in the individual's sensitivity and self-structure or that they are not isolated traits or ideas but

a whole pattern of ideas, dispositions and needs.

(ii) Attitudes are enmeshed in various parts of the person's total life space. One's attitude toward an object is not just part of his self-structure but it also has a social orientation. Many attitudes are not private but they represent a social distribution. Hence, people are reluctant to be identified with attitudes disapproved by people on whom they depend for affection or approval. Holding approved attitudes helps us to fulfil deep psychological needs. So deeply felt and broadly held attitude usually prove highly resistant to even a minor change.

Attitude Formation:

Attitudes and opinions are generally learnt. Attitude formation refers to the initial change from having no attitude to an object to having some attitude. Several factors, internal or external, influence the formation of attitudes:

(i) Genetic and physiological factors:

These deal with establishing a predisposition for the development of particular attitudes. An organism's general

level of aggressiveness, persuasibility and tolerance can be determined by genetic factors and this can affect his readiness to adopt certain attitudes. McGuire (1969) pointed out that this notion of genetic determinants of some attitudes does not imply that those attitudes could not be changed, given the right environmental condition, though the change process may be more difficult. Such conditions as aging, illnesses, and the effects of various drugs exemplify physiological factors in attitude formation.

(ii) Direct Personal Experience:

The most fundamental way of attitude formation is through direct personal experience with the attitude object. Salient incidents particularly frightening or traumatic ones either in form of powerful negative conditioning (States, 1968) or in terms of an information - processing model (Fishbein & Ajzen, 1975) lead to attitude formation. Repeated exposure to an object is also very attitude-enhancing: Zajonc (1968a) emphasized that mere exposure to a stimulus object without any associated reinforcement or tension reduction is sufficient to enhance a person's attitude toward the object.

(iii) Parental Influence:

A Child's attitudes are shaped mainly by explicit teaching and implicit modelling of parental attitudes. Many childhood attitudes are therefore a combination of the child's own experience and what he has heard parents say or do. Generally, children's level of prejudice is related to their parents' prejudice which they take over directly (Bird, Monachesi & Burdick, 1952; Epstein & Comorita, 1966). As children grow older parental influence on their attitudes tend to be eroded by many other influences, and by adolescence, the degree of parent-child similarity is faint. Relationships have been established between children's development of prejudice and their parents' child-rearing methods: emotionally cold, status-oriented parents who stress obedience, discipline and physical punishment are likely to have highly prejudiced and authoritarian children (Triandis & Triandis, 1962).

(iv) Group Determinants of Attitudes:

A strong influence in the formation of attitudes is the pressure of various groups like the school, peer groups and reference groups. School teaching and indoctrination are second only to parental influences in determining children's

attitude. The importance of School influence especially in political attitudes has been emphasized (Almond & Verba, 1963; Hess & Torney, 1967; Tolley, 1973). After the family and the school, the child's peer group is the next major determinant of attitudes. Peer group contacts and influence are very dominating in the child's life and during secondary school years discussion of politics with friends increase highly (Hyman, 1959). Actually, friends' attitudes and voting intentions have been found to influence the child's attitudes and behaviour at this time (Coleman, 1961).

(v) Mass Media:

Newspapers, magazines, movies, radio and television have had enormous impact on the society generally in the active transmission of information. This is very much relevant to attitude formation since people's information and beliefs are important factors in their attitudes. Apart from transmitting information, they select, emphasize, and interpret particular events. By publicizing people's reaction to such events, they define crucial issues of the day to which the public must form attitudes. Mass communication is effective in creating

opinions and attitudes on new issues where there are no existing predispositions to be changed (Klapper, 1963).

Attitude Change

Changes in attitudes do occur in spite of the embeddedness and enmeshment qualities of attitude. Two theoretical approaches to attitude change have been proposed:

(i) Katz (1960) and his associates put forward the functional approaches which emphasize that attitude change depends on the individual's personality needs and motivation. Attitudes serving different functions will be aroused in different types of situations and changed by different types of influences.

(ii) Learning approaches to attitude change stress that learning processes are responsible for attitude change (Insko, 1965; Bem, 1965). The protagonists of this theory all stress stimulus-response connections, the importance of reinforcement or contiguity in learning.

In classroom situation, the more favourable the pupils' relationship with the teacher, the better are the possibilities for change. Pupils' attitude toward a

subject depends on their feelings of enjoyment or boredom, and success or frustration. Although, attitude changes can be effected, they must be carefully engineered (Rosenberg, 1960). On the relationship between reading attitude and achievement, Alexander (1976) asserted that a positive attitude is essential for successful mastery of the written page. The importance of both the teacher's attitude and the pupils' attitude in the acquisition of reading skills has been stressed (Stott 1973; Agin 1974 and Koe, 1975).

The enduring nature of attitudes has been pointed out (Newcomb et al, 1967; Thistlethwaite, 1974) hence attitudes formed are difficult to change. This is why students should be helped to develop positive attitudes to their subjects since positive attitudes enhance achievement in academic work.

Oyetunde (1986) spelt out the importance of knowing the attitude students hold towards school subjects and he concluded that people learn more easily and remember longer materials that are consistent with their attitude. He further opined that the teacher, however, needs to go beyond merely knowing students' attitude toward his subject,

and determine to what extent students' attitude relate to their achievement in the subjects so as to be able to make predictions.

EMPIRICAL STUDIES

Factors in Achievement & Under-Achievement:

Many studies have focussed on the personality of the underachievers. Catell (1966) found negative correlations between personality characteristics and discrepant achievement. Moreover, underachievers are characterized by negative aspects of self-concept (Mehta, 1969), and they are significantly higher on manifest anxiety and test anxiety (Davids, Sidman and Silverman, 1978).

Lacher's (1973) result supported the hypothesis that underachievers would be significantly more likely to report and display irresponsible behaviour arising from impulsivity and anxiety over achievement in work situations. Other consistent findings relating underachiever to problems in impulse control pointed out that underachievers rarely ever come to treatment (Kipnis, Lane & Berger, 1969, Lavin, 1965) or make use of counselling relationships (Kipnis & Resnick, 1971).

Underachievers also recorded low scores on achievement anxiety test, studied less for a test and performed less (Wittmaier, 1976). Murakawa (1969) confirmed that they are low in some aspects of thinking and memory and that they show a rather unbalanced profile. Some traits found to be interfering with the underachiever's use of their intellectual resources are pessimism, distrust, anxiety, egocentricity and resentment (Propper, 1970).

Wattenberg & Clifford (1964), Williams (1973), Rogers et al (1978), Bridgeman & Shipman (1978) and Hansford & Hattie (1982) found a positive correlation between achievement and self-regard just as several other studies (Binder, 1970; Cummings, 1970; Loguidice, 1970; & Shavel, 1982) found that general self-concept and scholastic achievement are related. Haun's (1965) finding showed a positive relationship between introversion and academic achievement.

Studies on the relationship between achievement and academic achievement motivation showed that underachievers lack academic motivation (Terman & Oden, 1947; Brown et al 1954; Holland, 1959, Mitchell, 1959). On the other hand, good academic achievers are characterized by high drive

levels (Lynn, 1959). However, Cole et al (1962) found a significant relationship between need achievement and academic performance only in low achieving college students. When a test of motivation to achieve was individually administered to some children in two classes, results indicated that the children in responsive classroom were more highly motivated than the children in the non-responsive classroom. (McFadden, 1978). An achievement motivation training course was given to some twenty-four teachers who then trained some 8th and 10th graders (Ryals, 1973); evaluation of the trained students' grades in Mathematics, Science and Social Studies showed that trained students performed significantly better than a randomly selected group.

Would there be any sex difference in the underachiever's personality traits? Taylor and Farquar (1965), found that among discrepant achievers, anxiety manifests itself differently between the sexes: there is evidence of tension and restlessness among boys whereas for girls there is emotional instability (withdrawal into fantasy and acting-out behaviour). Boys were ambivalent in their goal orientation which suggests an underlying tension, resulting

from lack of purpose. They also tended to rebel against authority and social norms while girls expressed more concern with the maintenance of standards. Boys showed a success orientation, which placed a high value on self. Girls showed social distance characterized by low involvement in interpersonal relations.

Much thought and work had been devoted to identifying, diagnosing and treating under-achievement (Brislow, 1962; Powell & Jourard, 1963; Roth et al 1967; Bailey, 1971; Gilbreath, 1971). Drews and Teahan (1957) pointed out that high academic achievement may be associated with negative parental behaviours and/or over-protection; they found that mothers of high achieving junior high school student, in contrast to mothers of children who were underachieving, express more punitive attitudes toward child disobedience and are more rejecting of their off-spring. Efforts at changing college achievement patterns through counselling or psychotherapy have met with inconsistent results: some researchers reported positive findings (Sheldon & Laudsman, 1950; Chestnut, 1955; Cilbreath 1967, 1968) while others reported that counselling was ineffective (Goodstein & Crites, 1961; Winborn & Schmidt, 1962; Spielberger & Weitz, 1964).

Regarding the causes of underachievement, Kraft (1969) reported that underachievement is due to negativism, inferiority feelings, high anxiety, boredom, inability to tolerate less than perfection and over-protection. In a study conducted by Miller (1962) 331 underachievers ranked, in order of importance, eleven reasons for their academic failure:

- (i) Poor study Habit
- (ii) Insufficient Study
- (iii) Lack of interest in subjects
- (iv) Emotional problems
- (v) No vocational goal
- (vi) Home circumstances
- (vii) Insufficient home study preparation
- (viii) Inadequate study facilities
- (ix) Employment
- (x) Co-curricular activities
- (xi) Illness

In a recent study, Medahunsi (1985) attempted to determine the causes of underachievement at the undergraduate level; he found that most undergraduate students lack effective study techniques. Therefore, as the main cause of underachievement

'Study Skills' deserves some attention.

Study Skills

A wide proliferation of problems revealed by interviews with college freshmen showed that the direct problem of the students related to study behaviour (Lesnik, 1972). In a survey of the reading and study skills of pupils in Nigerian secondary schools, Prince (1960) found 90% of the pupils lacking in study skills. In the same way, Unoh (1977) discovered that 80.5% of the secondary school pupils he used were terribly deficient in study-reading skills. In an investigation, Koile & Birds (1956) asked college students to list their problems; the students all mentioned difficulties with their studies more than any other type of problem. Perry et al (1959) found that even the good (passing) students have defective study skills.

Conducting a study to find out the relationship between personality problems and study habits of Nigerian adolescent, Emeke (1984) found out that many Nigerian adolescent have poor study habits, and that teacher consultation, examination, concentration, study period procedure, and

note taking ranked highest among the subjects as study habit problems. Danskin & Burnett (1952) reported that the study techniques of superior students are essentially the same as those of other students. In fact, an earlier scholar, Williamson (1935) found that good students necessarily study no more but usually slightly less than poor students; good students just use their time effectively. However, Cuff (1937) discovered that many of the good study habits which he examined were repeatedly being followed more exactly by inferior students than by better ones.

Shaw (1961) found that majority of fresh students in colleges and universities need formal guidance and instructions on reading not just as a remedial measure but as a regular orientation programme needed for college adjustment. Using 1976 Nigerian secondary school students with poor study habits, Akinboye (1977) found out that most students need some sort of psychological support in order to overcome their poor study habits problems. Basse (1986), however, did not find any significant difference in the level of study habits problems between male and female students.

Crow and Crow (1967) put forward some set rules to

help students acquire efficient study techniques. However, the problem of persuading students to use newly acquired study skills persists (Harris & Ream, 1972). Investigating the effects of test anxiety on study method and techniques, Wittmaire (1972) found that students with low anxiety scores have more efficient study skills and avoided delaying academic tasks while students with high test anxiety demonstrated unsatisfactory study habits. A number of empirical studies pointed out that highly test anxious students have poorer techniques of study than do less anxious students (Sassenrath, 1967; Desiderato and Koskinen, 1969; Culler & Holahan, 1980).

Inadequate study skills, however, had stronger effects on grades than test anxiety (Brown and Nelson, 1983). Across a wide variety of studies, cogent evidence indicated a positive relationship between study habits and academic success (Chahbasi, 1958; Entwistle & Entwistle, 1971). Students with poor academic records tend to have inadequate study skills (Kirkland & Hollandsworth, 1979) whereas high attainers were superior in their study practices (Jain and Robson, 1969). Miller's (1962) study on study habits problems of students revealed that there is a relationship

between study habits and academic performance. From his study on habit modification, attitude change and academic performance, Akinboye (1974) inferred that if study habits of individuals are correctly modified then the level of their academic performance would increase.

Entwistle (1960) reviewed some research studies in which college study skills courses were evaluated; improvement in students' grade was experienced. Also students who were motivated to improve and who voluntarily enrolled in study skills courses raised their grade point averages whereas those who were similarly motivated but who did not enrol failed to make the same gains (Berg & Rentel, 1966). Brown (1965) mounted "a study skills guidance programme" for a set of students who at the end of the were found to have earned significantly higher grades. Ogunlade (1981) observed that the modification of study attitudes through behavioural group counselling led to favourable attitude towards performance in the experimental subjects.

Investigating the likely differences in the knowledge and usage of study techniques, Weigal & Weigal (1963) discovered that the use of study skills by freshmen correlated

with academic achievement. Reviewing the effects of individual and group counselling on the study habit of sixty school students, Alexakos (1970) found out that both forms of counselling improved study habits. In a study of some psychological correlates of academic success and failure, Bakare (1975) found positive correlation between academic attainment and efficient study habits.

There has been increasing emphasis on the techniques used by students in their effort to learn from written materials (Noall, 1962, Pauk, 1973). Several studies have also proved that study skills training can be very effective, for example, courses on how to study proved so positive that it was recommended to be part of the curriculum (Aspurua-Arillaga, 1966). Some students who received study skills training exhibited significantly greater positive pre-course-post-course changes on comprehension, retention, and self-report measures than did students in the control groups (Danscreau, Colins, McDonald, Holley, Garland, Diekhoff and Evans 1979). Katahn, Strenger and Cherry (1967) reported that their subjects attributed their improved academic performance following treatment to changes in their approaches

to study. Students involved in contracts on a study skills programme gained better grade point averages and maintained this improvement for two years (Goldman, 1978). Subjects reported improvement in their academic abilities and admitted that a study programme had increased their efficiency and time spent studying (Harris & Trujillo, 1975).

Osterhouse (1972) and Altmaier & Woodward (1981) have, however, proved that study skills training alone is usually found to be ineffective in either reducing anxiety or improving academic performance. On the other hand, a combination of study skills training and systematic desensitization was shown to be effective and superior both in reducing anxiety and in improving academic performance (Allen, 1971; Mitchell & Ng, 1972; Mitchell et al, 1975, Lent & Russell, 1978). Regarding the effects which the time of study has on study and academic performance of students, Akinboye (1976) found out that morning students were better on study attitudes and academic performance than the afternoon shift students.

Does students' mental ability affect the outcome in study skills training? Dimichael (1953) examined the effect of a 'how to study' course upon different I.Q levels and came up

with the following results:

- (i) the course has proved its value for the middle group of mental ability,
- (ii) students of very poor ability do not profit noticeably from the course,
- (iii) the course has not demonstrated its value objectively for the students in the highest quarter of mental ability.

In fact, subjects' achievement level had been known to affect their disposition to study programmes: underachieving students seem to believe that improved methods of studying are beyond their control, and find it difficult to commit themselves to a programme of change (Beneke & Harris, 1972 and McCreynolds & Church, 1973). Robysk (1979) found that non-underachievers reported greater study skills knowledge than underachievers.

Fostering Reading Comprehension

The importance of possessing good reading skills, and of its positive effect on academic performance cannot be overemphasized.

After studying 5th grade social studies instruction,

Armbruster & Gudbrandsen (1986) concluded that a lack of direct instruction on how to read and study for content frustrated students' attempts to understand what they read. Kingston (1955) examined the grade point averages of some students and reported remedial reading group average significantly greater than the control group average. Significant correlation has been reported between reading achievement and grades in College, and between comprehension grades and vocabulary (Jackson, 1955); Robertson, 1960). Smith (1967), found that students who had taken a reading improvement course showed significantly greater gain in grade point average than a comparable group of students who did not participate. A substantial positive correlation was obtained between scores on a reading comprehension test and grades in pre-law courses (Harens, 1968). Reading ability contributed significantly to the performance of students on programmed material (Herr and Tobias, 1970).

Ayodele (1978) found that Nigerian students at the post-primary school level read far too slowly and possess low comprehension. With unskilled comprehenders, the deficiency is capable of leading to further diminished comprehension skills (Perfetti & Hogaboam, 1975). In terms

of adjustment to the content read, good comprehenders adjust their rate of reading by slowing down as the material increases in difficulty, whereas poor comprehenders apparently read easy and difficult material at much the same rate (Bloomers & Linquist 1944).

Regarding the relationship between comprehension and speed, Bridges (1951) discovered that any training which emphasized Comprehension and took no account of speed was more effective in developing speed and comprehension than was training that emphasized speed and minimized comprehension. On the other hand, Mistler - Lachman (1974) examined the effect of comprehension depth upon sentence recall and found that deeper comprehension leads to better recall; this finding supports the use of memory measures as an estimate of comprehension. Pickards & Hatcher (1977/78) found that for most measures of text recall, good comprehenders recalled more than the poor comprehenders. Investigating whether sex differences in reading comprehension are affected by variations in the interest level of the material, result indicates that boys read as well as girls on high interest material but that they were significantly poorer readers of low-interest material (Asher, 1974).

Doctorow (1978) predicted and found that the facilitation of generative processes by insertion of paragraph headings and instructions to generate sentences about story paragraphs during encoding, produced the greatest comprehension. This is because reading comprehension occurs when readers actively construct meaning for text. What impact does questioning have on Comprehension? Questioning at any point during reading has been known to improve comprehension (Fraser, 1967). The quality as well as rate of comprehension was improved through the use of questioning, that is giving questions to the readers before or as they read in order to give them a basis for selecting and organizing the materials presented (Bruning, 1968). Adejumo (1972) found that the use of students' guide questions aid comprehension & retention. Durkin (1978/79) however, found that questioning was the major instructional strategy used to teach comprehension and that a typical questioning session was really an assessment activity that was of little value in developing lasting comprehension skills.

Related to the Schema theory, Arnold & Brooks (1976) investigated the effects of verbal and pictorial organizing

material on comprehension of paragraphs: results suggested that knowledge of the interrelationships among elements is important, if not essential for the comprehension of prose material.

Effectiveness of Robinson's SQ3R

Robinson's SQ3R is a study technique which has been used to help many students achieve greater success in their academic work. It has been found to be particularly helpful in the case of inadequate study effort (McCreynolds & Church, 1973). Briggs, Tosi & Morley (1971) combined conditioning with the SQ3R study technique on the academic performance of 'high risk' students. The results obtained were in the hypothesized direction that subjects exposed to the procedure would demonstrate higher GPA's than the control group. In another study, students receiving lessons in the use of the SQ3R method showed significant gain in GPA for the three semesters following the study (Beneke & Harris, 1972). Using the SQ3R technique plus some behaviour modification strategies to modify the study habits of some subjects, Akinboye (1974) found that subjects whose study habits were modified changed their belief that academic task was difficult. In another experiment, Akinboye (1976)

looked into the combined effect of both the Robinson's SQ3R study and conditioning techniques on the cognitive, affective and conative components of study attitude and academic performances of students treated in the morning and those treated in the afternoon and he found that the morning subjects performed better than the noon group in Mathematics and that the morning subjects are academically superior to the noon group in the same subject.

Survey and questioning, two of the steps involved in the use of the SQ3R study technique, have been used to effect in many studies. As far back as 1934 McClusky found that a quick survey or preview of the headings made a trained experimental group read faster and comprehend better than the control group. Comprehension was enhanced when Graves (1983) tested text previews with below average junior high readers assigned to read complex short stories. According to the hypothesis developed by Rothkopf (1970), questions are very effective and they differ in how they focus the reader's attention depending on their location: questions that appear just prior to study material tend to focus the reader's attention for answers to specific questions. It has also been proved, that the use of questions

at the beginning of a section promotes a question attitude in subjects and provides a core idea around which to organize the material that follows (Ausubel, 1960; Wittroch, 1963).

Blank & Covington (1965) developed an auto-instructional programme to induce question-asking behaviour; they found that subjects who completed the programme received higher scores on an achievement test and were rated superior to the other group. Also, questioning activities produced higher comprehension rate and overall recall than just studying (Miles, 1967; Frase & Schwarts, 1975). Richards (1976) found that conceptual pre-questions produced higher comprehension and recall than conceptual post-questions. McGraw, Grotelueschen & Arden (1972) proved that the effect of inserted questions is superior performance on pages immediately after the questions made possible through increased attentiveness. Subjects with low vocabulary scores found text-material with questions placed after the prose passage more helpful than the text without questions (Shavelson, 1974). Swenson & Kulhary (1974) confirmed the characteristic facilitative effect of questions occurring after passage. Frequent interspersions of questions is

superior to larger blocks of questions; children scored high if questions had been interspersed with parts of the text (Hudgins, Dorman and Harris, 1979). Reynolds & Anderson (1982), found that text information relevant to question was learned better than text information irrelevant to questions because readers selectively allocate a greater volume of attention to question - relevant information.

Andre (1979) showed that higher level questions can have facilitative effects on both reproductive and productive knowledge. In a study done to assess the effect of post-passage question generation on comprehension question performance for elementary school students, Davey (1986) directed fifty 6th grade students either to read and re-read four expository passages or to generate two good "think-type questions for each passage prior to a comprehension test. Findings revealed that the question generation group exceeded the read-read group on higher-order inferential comprehension test items. Some studies also showed the powerful focusing effect of questions on learning from print (Anderson & Biddle, 1975 ; Anderson 1980) and the positive effects of teacher and experimenter questions on students' self-generated questions were discovered to be very important to enhance reading comprehension (Andre & Anderson, 1978;

Dreher & Gambrell, 1985). In the modifications of the advance organizers used for his study, Haastrup (1989) showed that the questioning-enriched programme were effective for both achievement and attitude.

As useful and as effective as questioning is however, studies of attempt to get students to use the questioning approach showed that students have difficulty in retaining this questioning attitude even though there are significant differences in the achievements of those who stated and held the questioning set and those who did not (Torrance, 1961 and Henderson, 1965). This shows that practice is needed to make one skilful in reading in this manner.

Review, the last step of SQ3R has also been proved to be worthwhile: Di Vesta & Gray (1972) compared a group who reviewed their notes with students who merely thought about what they read. The review group was more superior.

Summarization

Direct studies involving summarization are rather few. Dyer et al (1979) made college students read a text with or without taking notes. One half of the learners wrote passage summaries while the other half completed a

spatial relations task; more substantive information was acquired by the summarizers. Garner (1982) asked twenty-four undergraduate students to read an expository text and to write a summary of the text; the finding pointed out that what is included or what is omitted in a student's written summary tells us something about what has been understood from the text.

Kintsch et al (1977) discovered that younger and/or poor readers are more inclined to make decisions on a piecemeal, sentence by sentence basis, whereas older and/or good readers make their judgement based upon the meaning of the whole text. Ross et al (1976) conducted a study with 156 female under-graduates: one treatment group studies textual material with the expectancy that an oral summary would be presented later while another group studied the same material without this expectancy. They found that presenting summaries, and listening to oral summaries aid comprehension and recall. Arnold (1942) however, taking a group of subjects and trying the techniques of underlining, outlining, summarization, and simple re-reading of different tasks equated for difficulty discovered little or no difference in the effectiveness of the techniques

over each other. Two versions of a summarization intervention programme, the inductive and the deductive versions, were designed by Hare & Borchardt (1984). Instructions about the two versions were then delivered to high school students; the two groups were significantly different from a control group in terms of summarization efficiency and summarization rule usage and these differences were maintained two weeks after instructions had ended.

Some studies showed that generally students did not know how to use Summarization technique and that they become so much involved in indiscriminate copying from the text that their reading comprehension was actually hindered (Willmore, 1967; Thomas, 1978; Watkins, 1982). Brown & Day (1983) showed evidence of students' lack of summarization prowess when a formalized set of summarization rules are employed. The importance of real training in the use of Summarization technique had been exemplified by Stordahl and Christensen (1956) who found that underlining, outlining and summarizing while studying are not superior to reading and re-reading unless specific training has been given in the former methods. Taylor (1982), for example, recorded some success with his students who learned to improve their

comprehension and recall of content material and write better organized compositions when they were trained to use a hierarchical summary procedure which directed students' attention to the organization of ideas in content textbook selections.

Till et al (1977) showed that little systematic effort is made by researchers to foster required skills in the individual subjects and so the skill they are testing for may not be existing in the individual. In the present study the use of behaviour modification techniques among which are shaping, modelling and rehearsal, and the use of some forms of reinforcement such as token reinforcement, self-reinforcement and feedback will ensure that subjects are actively involved in the training programme and that the skill of summarization is acquired by the individual subjects.

Studies on Attitude

It is highly pertinent here to look into the relationship between students' attitude and their achievement. Neidt & Hedlung (1967) showed evidence to support the hypothesis that attitudes become progressively more closely

related to final achievement. In the same way, positive orientation toward scholastic affairs, is significantly related to GPA (Briney & Taylor, 1959) just as attitude towards the course and course grades are related (Wofford, 1968). The result of Lum's (1960) study confirmed the hypothesis that achievement differences noted in people of similar aptitude may be attributed to attitudinal and motivational differences. The present researcher supports Lum's conclusion that attitudes be considered in 'how-to-study' courses hence students' pre-treatment and post-treatment attitudes to English Comprehension and Biology were explored in this study.

High achievement and high attitude in teachers are positively associated with high achievement and high attitude in pupils, and attitude towards reading influenced achievement in reading (Schofeld, 1980). Various other studies reported significant positive associations between attitude and achievement (Groff, 1962; Nielson, 1978). Actually, Schultz and Green, 1953, Brown & Hoftzman, 1955 and Aiken, 1961 dealt with the relationship of attitude toward school and achievement and found significant relations. Fenneman (1973) used attitude toward course as one of the variables

that were able to consistently predict achievement levels of high school Mathematics and language students. Roettger (1972) discovered that children's attitude towards reading determine both the amount and the kind of reading they do. He therefore, recommended that the development of positive attitude toward reading is important as an educational objective and as an evaluative measure of the effectiveness of reading instruction. Finch's (1972) study, however, provided some evidence to show that relationship between attitude and behaviour were dependent upon the particular instructional approach used.

Concerning the relationship of attitude toward specific subject matter, Aiken (1970) reported some relationship between attitude toward Mathematics and achievement in the subject. Ramsett, Johnson and Adams (1974) focussed on the relationship between learning Economics and students' attitude; they discovered that learning Economics is closely associated with students' attitude towards the subject and that attitude is significantly associated with student's performance on test of understanding Economics. They then concluded that attitude and subject matter are not separate, but instead they are closely related, mutually enforcing

aspects of the learning process. However, Johnson (1968) reported that significant difference in total recalled comprehension could not be traced to differences in attitude.

Self-reported attitude towards work made a substantial contribution to the prediction of grades even when aptitudes are held constant (Veldmans, 1968). Bruvold (1972 & 1973) collected some data to test predictions derived from an hypothesis of attitude-behaviour, attitude-belief consistency; as predicted, results of questionnaire and interview show that both belief and behaviour correlated significantly with attitude.

On attitude change, Norris (1965) found partial support for greater attitude change for close-minded persons. The effects of two types of verbal reinforcement on attitude change were studied in the content of a structured interview; positive verbal reinforcement led to significant long-term affect change, while a combination of positive and negative reinforcement produced significant immediate modification of attitudes expressed in the interview (Buckhout 1966). The contract method of teaching with a study skills course proved to be very effective: students

whose independent projects in the study skills course had been structured by the contract method of teaching reported positive attitude change toward study (Goldman, 1978).

Regarding sex differences in attitude, Schofield's (1982) study indicated that observed relationship between attitudes and achievement were significantly stronger in boys than girls. Marjoribanks (1976) discovered that there are sex differences in relations between school attitudes, ability and achievement. In a study designed to investigate relationship between attitude and sex, Askor (1973) found attitude test scores to be significantly higher for females than for males. Finding out the attitudes of students towards school, Haladyna (1979) report that attitudes toward school decline more drastically for boys than for girls.

Some local studies on attitude have also found positive relationship between attitude and performance. Ogunlade (1986) gave experimental and control groups pre-and-post-tests of attitudes and achievement in Arithmetic. The significant improvement obtained toward performance in Arithmetic was explained in terms of the effectiveness of group counselling to assist teachers and students improve

their attitude to and performance in "dreaded and difficult" subjects. In the same way, Oyetunde (1986) found some correlation between attitude to and achievement in English. Using self-image psychology, Ignoffo (1988) helped students to improve their reading and vocabulary skills as they improved their attitudes about their abilities and sense of worth. Another finding worthy of note here is that brighter children tended to have more positive attitudes towards school subjects than weak ones (Kalejaiye, 1977).

DEFINITION OF TERMS

Robinson's SQ3R:

The SQ3R technique is a study procedure designed by Robinson in 1961. It is aimed at systematizing students' activities to ensure that the study is done efficiently to facilitate thorough understanding which is a pre-requisite in the enhancement of recall. Each letter/figure is an abbreviation making it easier to refer to the technique and remember each step involved. The abbreviation SQ3R stands for: Survey, Question, Read, Recite and Review.

Summarization:

This is another study technique in which subjects read the study assignment thoroughly, taking note of the important points and eventually synthesizing all that has been read to produce a synopsis of the study content. The inability of the student to produce the summary is an indication of lack of proper understanding.

Study Technique:

This is a highly specialized skill acquired to enhance the thorough mastery of the various school subjects. It involves a formalized effort to acquire knowledge and a high level manoeuvring of academic work with the background aim of:

- (i) making knowledge acquisition very effective interesting and less tedious.
- (ii) enhancing deep understanding of the material of study.
- (iii) facilitating effortless recall when the material is needed or during examination.

Comprehension:

Comprehension here connotes taking in or getting a good grip of the message of a written piece. It involves real absorption of the content read. Comprehension depicts deep

understanding, which is an important step in reading if knowledge acquisition is to take place. Lack of Comprehension can lead to misconception and wrong interpretation.

In this study, the researcher aimed at training the subjects to be able to reach at least the inferential level of comprehension in reading and study assignments.

HYPOTHESES

1. There will be no significant difference in the English comprehension ability of subjects exposed to treatments (SQ3R and Summarization) and those not so exposed (Control).
2. There will be no significant difference in the Biology Comprehension ability of subjects exposed to treatments (SQ3R and Summarization) and those not so exposed (Control).
3. There will be no significant difference in the attitude to English Comprehension and Biology of subjects exposed to treatments (SQ3R and Summarization) and those not so exposed (Control).
4. There will be no significant difference in the comprehension ability of subjects exposed to the SQ3R and Summarization techniques.
5. There will be no significant difference in the Biology comprehension ability of subjects exposed to SQ3R and Summarization techniques.

6. There will be no significant difference in the attitude to English & Biology of the subjects exposed to SQ3R and those exposed to summarization techniques.

CONCEPTUAL MODEL

The study techniques used ^{are} conceptualized in Figure I. The figure contains four types of variables, the first three of which resulted in the fourth after manipulation.

The first set of variables were the independent variables, that is, the treatment strategies: the SQ3R and Summarization techniques. The two strategies involved the use of reinforcement: self reinforcement, taken reinforcement, social (verbal) reinforcement, and feedback.

There is the second type of variables which were the first set of intervening variables. Five such variables were identified: motivation, perception, self-concept, cognition, and affect. These variables were not necessarily independent of one another but they were all internal to the subjects and they affected the outcome of the treatment.

The second set of intervening variables were also internal to the subjects but they were more outwardly manifested than the first set. Five such variables identified

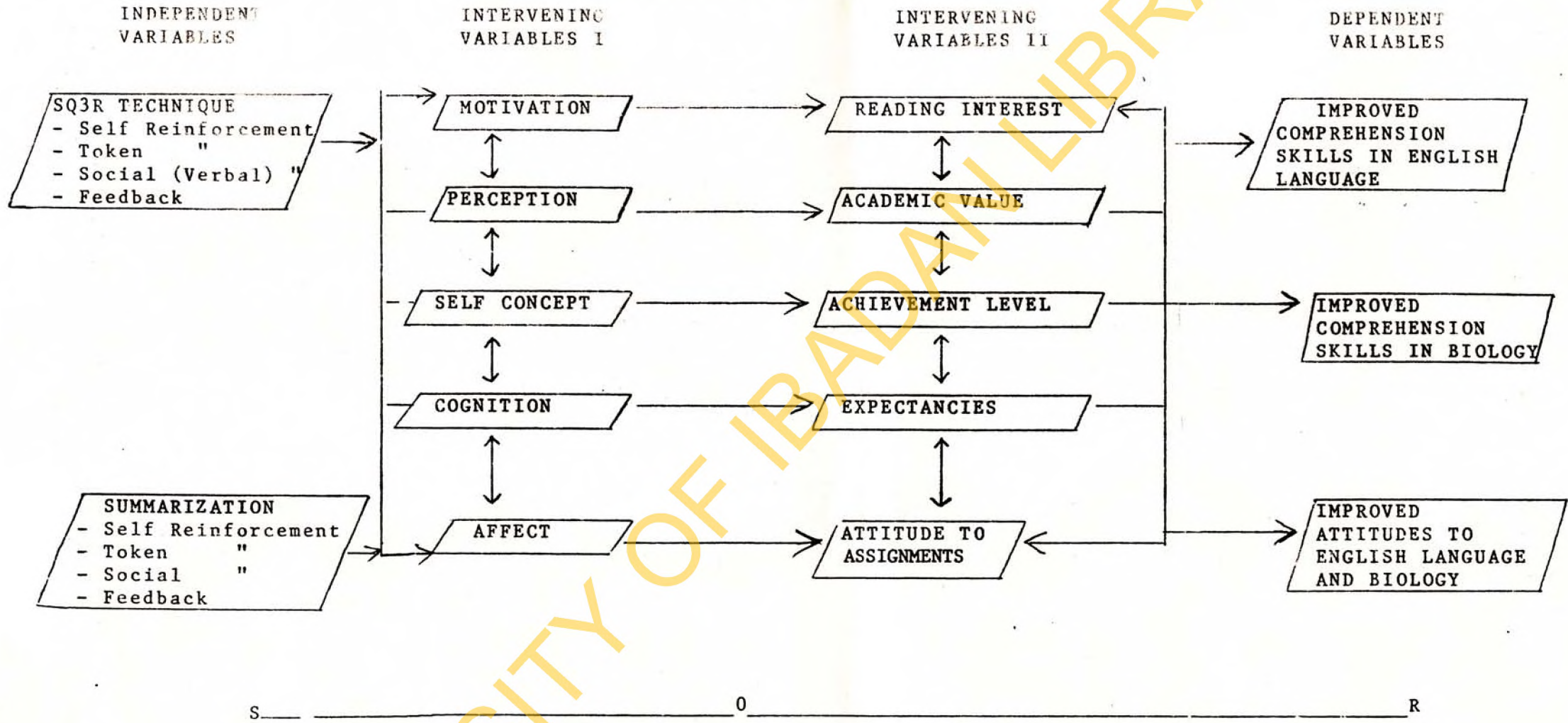
are reading interest, academic values, achievement level, expectancies and attitudes to assignment. These variables too affected subjects' response to therapy.

The dependent variables are the third type and they were the result of the intervention of all the preceding sets of variables. They also constituted the criterion measures. They are:

- (i) improved comprehension skills in English language
- (ii) improved comprehension skills in Biology.
- (iii) improved attitude to the two subjects.

Theoretically, it was expected that as the independent variables were manipulated, the subjects became more motivated to study, had better awareness, became more realistic, possessed better self-concept and acquired wholesome feelings. These changes modified subjects' reading interest, academic value, achievement level, expectancies and attitude to assignments. All the preceding changes eventually resulted in improved comprehension skills in both English Language and Biology and improved attitudes towards the subjects.

FIGURE 1: CONCEPTUAL MODEL



CHAPTER TWO
DESIGN AND PROCEDURE

This chapter spells out the research design, subjects, instruments, procedure, and the treatment programmes used for the study.

DESIGN:

The experiment adopted a 3 x 3 factorial design. The effects which the independent variables had on the dependent variables were examined. The effects of the two treatment methods (Robinson's SQ3R and Summarization) were thus designed to be observed at three levels of mental ability. The levels of mental ability - high, medium, and low - form the columns. Therefore, there were nine cells: six for the experimental groups and three for the control groups. All the groups were randomly assigned to treatment and control groups. Figure 2 presents a diagrammatic representation of the design:

FIGURE 2: DESIGN OF STUDY

RESEARCH DESIGN: 3 x 3 FACTORIAL

TREATMENT	SCHOOL	LEVEL OF MENTAL ABILITY		
		HIGH	MEDIUM	LOW
SQ3R	School I School II	1(1)	1(2)	1(3)
Summarization	School I School II	2(1)	2(2)	2(3)
Control	School I School II	3(1)	3(2)	3(3)

Treatment is a factor at three levels
Mental Ability is a factor at two levels

SUBJECTS:

The subjects for the experiment were some JSS III male and female students in Ibadan City. Subjects' age ranged between 13 and 18 years, with a mean age of 15.22 years and a standard deviation of 2.04. Intact classes, later classified into mental ability levels, were used. Campbell and Stanley (1966) hold that intact classes form natural clusters. Since the experiment took place during the school period, the school time-table had to be followed as the schools could not tolerate any disruption to its day-to-day programme and classes. The three arms of JSS III in each of the two schools were randomly assigned to the two treatment and one control groups.

The two schools used had certain characteristics in common:

- (i) Both of them were established in 1980.
- (ii) They both had three arms of JSS III classes.
- (iii) They were equally equipped in terms of basic facilities e.g. Science Laboratories, Library, Home Economics Room, etc.
- (iv) The minimum qualification of teachers in each of the two schools was N.C.E.; most of their teachers were graduates.
- (v) In both schools, students were classified into the three arms randomly, and not on the basis of ability.

The experiment took off with 116 subjects in the three classes in School I and 119 subjects in the three classes in

School II. Within each of the classes, subjects of high, medium and low mental ability were identified through the use of Raven's Standard Progressive Matrices (to be discussed later). A description of the treatment groups and their features appears in Figure 3:

FIGURE 3
TREATMENT GROUPS AND THEIR FEATURES

GROUP	FEATURE
1(1)	High mental ability subjects assigned to SQ3R
1(2)	Medium mental ability subjects assigned to SQ3R
1(3)	Low mental ability subjects assigned to SQ3R
2(1)	High mental ability subjects assigned to Summarization
2(2)	Medium mental ability subjects assigned to Summarization
2(3)	Low mental ability subjects assigned to Summarization
3(1)	High mental ability subjects assigned to Control
3(2)	Medium mental ability subjects assigned to Control
3(3)	Low mental ability subjects assigned to Control

Only the subjects who completed all the tests and took part fully in the treatment programmes were considered to be involved fully and effectively in the experiment. From these, eight subjects from each of the three levels of mental ability for each of the treatment groups in each of the two schools were randomly selected. Thus, the experiment ended up using a total of 144 subjects as shown in Figure 4.

FIGURE 4

FINAL DISTRIBUTION OF SUBJECTS

TREATMENT GROUP	SCHOOL	LEVEL OF MENTAL ABILITY			NUMBER IN EACH SCHOOL	TOTAL
		HIGH	MEDIUM	LOW		
SQ3R	School I	8	8	8	24	48
	School II	8	8	8	24	
Summarization	School I	8	8	8	24	48
	School II	8	8	8	24	
Control	School I	8	8	8	24	48
	School II	8	8	8	24	
TOTAL NUMBER OF SUBJECTS		48	48	48	144	144

INSTRUMENTS:

The following instruments were used:

1. Intelligence Test: Raven's Standard Progressive Matrices:

The test used to put the subjects into three ability levels, high, medium, low, was Raven's Standard Progressive

Matrices. It was originally developed in Great Britain by J.C. Raven. It is a non-verbal test of the individual's intellectual capacity and general mental ability. It tests the ability to perceive relationships in shapes and figures. The test's culture-free nature makes it very popular among psychologists in the U.S.A. and in Africa.

It is a validated scale which consists 60 matrices items divided into five sets (A, B, C, D, E) of 12 items each. For each item there is a diagram from which a part has been removed. The subject is then required to complete the design by selecting the missing part from six or eight alternatives provided below each design. Each set increases in difficulty: the earlier set requires accuracy of visual discrimination only, while the subsequent ones involve two-dimensional analogies demanding perception of logical relation and complicated permutation to arrive at the correct answers. The test is very easy to administer; the materials needed are pencils to record the correct answers, the test booklets (one for each subject) and the answer sheets on which the answers are recorded. After a thorough explanation about the correct procedure by the researcher, the subjects commenced the test, writing down the letters of the correct

answers. The test could not be included in this thesis because of its bulky nature. However, its key and a sample answer sheet are included in Appendix E. A copy of the test should be readily available at the Department of Guidance and Counselling in any University.

2. Comprehension Tests:

These were administered on pre-test/post-test basis to students. They were constructed and validated by the experimenter. They were of two types:

(a) English Comprehension Test:

Designed by the experimenter, its final draft contains fifty multiple-choice comprehension questions based on four selected English comprehension passages taken from Faster Reading for Better Comprehension by Dr. S.O. Ayodele (See Appendix F for the English Comprehension test). Each question was followed by a five-alternative answer from which the subjects chose the correct one.

Validity:

The 100 questions originally drawn were reduced to fifty through a rigorous process of item analysis and validation. The test was administered on fifty J.S.S. III

students in a neutral but similar school. Only questions having between 45 and 55% in Item Difficulty test were included (See Appendix G for English Comprehension test Answers and the Item Analysis). This rather low Item Difficulty Index was taken to ensure that the items were moderately difficult, so as to leave room for any possible improved post-treatment performance on the test when it was administered again (post-test). An arrangement of students' scores from highest to lowest and a thorough inspection of the items scored right by the bright and dull students ensured that only the items that thoroughly discriminated between the bright and dull students were included and the others were discarded.

The validity of the test was ascertained by referring the draft to three J.S.S. III English Language teachers who did a thorough scrutiny of the items for the test's face and content validity and also for proper phrasing of each item. The test was then modified based on the suggestions and advice of these experts. Thus, the experimenter ended up with fifty items,

Reliability:

It was then pre-tested on a set of 100 J.S.S. III

students in another similar school; a test re-test reliability co-efficient of .85 was obtained after three weeks' interval.

b. Biology Comprehension Test:

This was also designed by the experimenter, It contained four Biology-based passages on which some multiple-choice questions were set. Each question here, too, was followed by five alternatives from which the subjects again chose the correct answer. (See Appendix H for Biology Comprehension Test).

Validity:

Following the same process as for the English Comprehension test, the 100 questions originally set were also subjected to thorough processes of item analysis and validation. The item difficulty index also ranged between .45 and .55 (See Appendix I for the Biology Comprehension Test Answers and the Item Analysis). The items were further pruned down to ensure that only the items that clearly discriminated between the bright and dull students were retained.

For the face and content validity of the test, comments

and suggestions were invited from three J.S.S. Biology teachers. The final draft, containing fifty questions, was produced in line with the modification done by these experts.

Reliability:

A test-retest reliability co-efficient of .82 was obtained when the test was repeated, within a three weeks' interval, on a set of 100 J.S.S. III students in another school.

Comprehension Test Duration:

After the item analysis and the validation procedures were done, and before the test-retest reliability was undertaken, each of the two comprehension tests was administered on a set of fifty J.S.S. III students in a school similar to the ones used for the experiment so as to determine the correct timing for the tests. The length of time spent by the first and last students to finish the English Comprehension spent 1 hour .21 minutes and the last student spent 1 hour .49 minutes. As for the Biology Comprehension Test the first student spent 1 hour 18 minutes while the last spent 1 hour 50 minutes. Since these were

tests of comprehension, the length of time spent by the slowest student was used to determine the duration for the tests. This is to ensure that subjects had enough time to do the test so that inability to finish could not have been due to lack of adequate time but lack of comprehension. Thus, the duration for each of the tests was set at 1 hour 50 minutes.

3. Attitude Tests:

(a) English Comprehension Attitude Scale

(b) Biology Attitude Scale

These, too, were administered on pre-test/post-test basis. A slight modification of Aiken & Dreger's 1961 (revised by Akinboye 1974) Attitude Scale was used. (See Appendices J & K for The English & Biology Comprehension Attitude Scale). It is a validated Likert-type scale scored 1-5 ranging from Strongly Disagree to Strongly Agree to denote the variability of the affective components of subjects' attitudes to the subjects. The authors reported a test-retest reliability of 0.94 for the 20-item scale.

PROCEDURE:

The two schools used for the actual experiment were

Eleyele Secondary School, Eleyele, and Community Grammar School, Ring Road - both in Ibadan. Three months before the commencement of the experiment, that is, at the beginning of the 1989 school year, a visit was paid to the two schools by the experimenter to solicit the principals' permission to carry out the study in their schools. The purpose and the scope of the study were discussed with the principals. The experimenter asked to be introduced to the J.S.S. III English Language and Biology teachers in both schools. Since the experiment was carried out during the school period, the J.S.S. III scheme of work in both subjects were used. The comprehension passages and the Biology topics for the first six weeks of the 2nd term were taken down by the experimenter in order to base the treatment programmes on the topics. The co-operation of the subject teachers was solicited as the experimenter called on them constantly to ensure that the subject matter prepared, especially in Biology, was in line with the expected standard.

The two subjects, English Comprehension and Biology were chosen to ensure that the two techniques were tried on one Art and one Science subject. The current emphasis in Nigeria on the advancement of Science and Technology justifies

the inclusion of a science subject in the study. As discussed earlier, very many of the previous relevant studies reviewed made use of Art subjects: Reading, History etc. The inclusion of Biology, a science subject involving many diagrams, introduced a new dimension. Even though Integrated Science, covering three subjects-Physics, Chemistry and Biology - is offered in the J.S.S. classes, only the Biology aspect is used in this experiment to avoid the complexity that may arise from trying to cope with all the three aspects under the same umbrella. It was hoped that if the techniques were effectively acquired by the students, they should be able to broaden the scope and apply them to the other aspects and other subjects.

The mental ability test, which was used to classify subjects in each of the three arms of the two schools into high, medium, and low, was first administered. Then the following pre-tests were given to each of the three classes (See the Treatment Sessions below):

(a) Comprehension tests:

- (i) English Comprehension
- (ii) Biology Comprehension

(b) Attitude tests:

- (i) English Comprehension Attitude
- (ii) Biology Attitude test

Each of the three classes in the two schools were randomly assigned by ballot to treatment techniques: Group 1 was assigned to the SQ3R technique, Group 2 was assigned to Summarization and Group 3 was the Control group (No treatment). From this stage, there was no more contact with Group 3 until after the treatment when the three groups will be given post-tests.

On the whole, the experiment was carried out in eleven weekly sessions of eight periods per week in each of the schools: two weeks for the mental ability and pre-tests, one week for General Orientation, six weeks for the actual treatment and two weeks for post-tests. The eight periods per week in each school were spent thus: with Group 1 (SQ3R)-2 periods for English Comprehension and 2 periods for Biology; with Group 2 (Summarization)-2 periods for English Comprehension and 2 periods for Biology.

Even though the time-tables in the two schools were generally followed, a slight modification was requested to ensure that the experimenter did not experience any clash in the two schools where the experiment was going on at the same time. The post-tests which came up during the 10th & 11th weeks of the experiment followed the same order as

the pre-tests were given.

TREATMENT PACKAGE

The two treatments were carried out separately in both schools twice a week each with the two treatment groups: once using English Comprehension as the subject of study and the second time using Biology. The treatment techniques used were SQ3R and Summarization. Each treatment session lasted two periods of forty-five minutes each, making ninety minutes (90) per session, and two sessions per treatment per week. The two techniques employed some behaviour modification techniques like shaping, modelling, rehearsal and active directive teaching. Also some forms of reinforcement used were self-reinforcement, verbal Reinforcement, Token Reinforcement and Feedback.

The treatments took place during the normal school hours and a slight modification was effected on the timetables of the two schools to avoid any clash during the times the therapist should be in each of the two schools. On the whole, the therapist spent eight periods per week, mainly during the morning hours, in each school: four

periods for each treatment technique - two periods for English Comprehension and two periods for Biology. Two classes in each of the Schools constituted the two treatment groups while the third class was the control.

PRE-TESTS

WEEK I

Session I:

The therapist met all the J.S.S. III students in the three classes together in each of the two schools. The therapist introduced herself and she gave the subjects the opportunity to introduce themselves. The therapist then explained to the subjects that it would be highly essential for them to complete some psychological tests first. An appeal was made to the subjects on the importance of their cooperation to the success of the venture. In order to get the best result from the tests the therapist appealed to the subjects to be honest in their response. They were also enjoined to be punctual and regular for various exercises.

The mental ability test (Raven's Progressive Matrices) (See Appendix E) was then administered on the subjects

including the control group. The therapist administered the test to the subjects personally, class after class, to ensure that the test's rudiments were adequately followed. Scores from this test were used to screen the subjects into ability groups: high, medium and low.

Session II:

Subjects were led to take the English Comprehension test (see Appendix F), which enabled the therapist to know the pre-treatment English comprehension ability of the subjects. The test was administered personally by the therapist in each of the classes i.e. including the control.

Week 2

Session I:

The Biology comprehension test (See Appendix H) was administered to the three groups in the same way as the English Comprehension test was administered. This was a test of the subjects' pre-treatment ability to read and Comprehend Biology-based contents.

Session II:

Since there was some focus on the subjects' attitudes as one of the variables measured, subjects' attitudes

towards English Comprehension and Biology were measured through the administration of English Comprehension Attitude Scale and Biology Attitude Scale (See Appendices J & K.). The attitude tests were administered to the two experimental and control groups. The test enabled the therapist to measure the subjects' pre-treatment scores which will later be compared to their post-test scores.

When the subjects had completed all the tests, the therapist expressed appreciation for their co-operation so far and she also expressed the hope that the subjects would continue giving such co-operation during the remaining part of the programme. Hencefore, the subject in the control group were asked to stop attending the subsequent sessions. The therapist tried to convince the control group that since closer contact between the therapist and the subjects was highly essential, fewer students could be handled at a time, and that as soon as the treatment was completed with the experimental groups the control group would be recalled.

The scores obtained during these first two weeks formed the pre-test scores.

Appendices A & B present the details of the SQ3R and Summarization treatment programmes summarized below:

THE ACTUAL TREATMENT SESSIONS-GROUP I:
THE SQ3R TECHNIQUE (SEE APPENDIX A FOR THE FULL DETAIL)

Week 3

GENERAL ORIENTATION 1-1½ HOURS

(a) Objectives:

The therapist met Experimental Group A, already screened into three ability groups - high, medium, low in their class. The aims and objectives of the treatment were discussed:

- (i) To help subjects acquire improved study habits.
- (ii) To improve subjects' comprehension ability.
- (iii) To make learning more meaningful and interesting to subjects.
- (iv) Ultimately, to help subjects attain a high academic standard.

(b) Orientation:

The therapist then gave to the subjects the SQ3R Explanation Handout and she went through it with them.

- Awareness & Motivation
- Rationale
- Explanation: the SQ3R technique
- Self Reinforcement

THE (SQ3R) TRAINING SESSIONS (WEEKS 4-6: 1-1½ HOURS FOR EACH SESSION).

Wee 4

Session I:

SQ3R Steps I and II: Survey and Question (English Comprehension

Step Survey:

The therapist took the subjects through step I of SQ3R: Survey:-

- The therapist gave out to the subjects copies of the The Forest is our Playground by M. Murphy & K Onadipe and The Voice by G. Okara, which were used in training them the act of surveying.
- The therapist took the subjects through the different sections of the books and pointed out the areas to be survey.
- The therapist also gave out copies of The passage "Louis Pasteur" (from Secret Formula by McCallum, pp. 37-39). The therapist led the subjects to survey the passage.

(iv) The therapist applied verbal reinforcement to encourage the subjects whenever they mentioned a correct point.

Step II: Question

The therapist led the subjects to raise questions about the points surveyed in the books and the passage. She gave the subjects SQ3R worksheet I (See Appendix Ci). The subjects were encouraged to apply self-reinforcement by issuing positive self-statements which served as morale booster.

Session II:

SQ3R Steps I & II: Survey & Question (Biology)

The therapist undertook an active teaching of Biology Study Content I: Digestion (1) using Chart I (See Appendix A for Biology Study Contents). She then handed over to each subject a copy of Study Content I as home assignment for the subjects to apply the first two steps of SQ3R: Survey & Question, in preparation for studying the content. The subjects were told to get a notebook each where they would do any assignment given them on SQ3R.

Week 5Session I:SQ3R Step III: Read (English Comprehension)

- The therapist discussed the last assignment to see if they encountered any difficulty in applying the first two steps of SQ3R.
- The therapist explained the next step "Read" in behavioural terms: setting up a time-habit and place-habit for reading, clearing one's table of irrelevant materials, getting all the materials needed ready, avoiding procrastination and distraction etc.
- The therapist gave out the reading passage, "Louis Pasteur".
- With a pencil in hand, she modelled how to do the reading and got the subjects to rehearse.
- The therapist applied Verbal Reinforcement each time the subjects did well.

Session II:SQ3R Step III: Read (Biology)Active Directive Teaching:

- The therapist again taught the subjects Biology Study

Content II (Digestion II) explaining thoroughly the diagrams and using Chart II: Digestion (II)" (See Appendix A for details).

- She handed to the subjects a copy each of Study Content II and she told them to study it from home, applying the first three steps of the SQ3R technique which they had learnt.

Week 6

Session I:

SQ3R Steps VI & V: Recite and Review (English Comprehension)

Recite:

- The therapist went over the last assignment to see how well they applied the first three steps of SQ3R.
- Subjects were led to read through the passage ("Louis Pasteur") again in readiness for the next step: "Recite".
- The therapist trained the subjects how to recite (See Appendix A). They should not recite orally; they were made to jot down important points. Subjects were given SQ3R worksheet II (See Appendix Cii).

Token Reinforcement:

- A tick was put beside each point correctly recited.

Review:

- The therapist got the subjects to take out the passage again and she trained them to review it.

Verbal Reinforcement:

- The therapist issued encouraging remarks to encourage the subjects.

Self Reinforcement:

- The subjects were encouraged to make positive statements about their effort and determination.

Session II:

SQ3R Steps IV & V: Recite and Review:
Biology

Active Teaching:

- The therapist taught the subjects Biology Study Content III "Reproduction", giving a thorough explanation and using diagrams IIIa & IIIb and Charts IIIa & IIIb showing the male and female reproductive organs.

- Subjects were encouraged to participate fully and ask questions on any point not understood.
- Biology study content III were distributed to the subjects to study from home, applying the SQ3R technique.

Self Reinforcement:

- Subjects were encouraged to make some positive self-statements to encourage themselves and boost their determination to apply the SQ3R technique to their study.
- (iv) Subjects' SQ3R note-book were collected and marked during the week in readiness to give the subjects feedback for the next SQ3R Biology session.

THE (SQ3R) PRACTICE SESSIONS

Week 7

Session I:

English Comprehension (Practice):

- Session 7 was opened with a revision of the five steps of SQ3R: Survey, Question, Read, Recite, Review.
- The therapist distributed to the subjects Practice Passage I: "Eze Learns A Lesson" (See Appendix A for details).

- The subjects were led to apply the SQ3R technique step by step, the whole class going on at the same pace. The therapist provided assistance and leadership as necessary, ensuring that the intensive reading was properly organized.

Token and Verbal Reinforcements:

- The therapist went round to put a tick beside each point correctly recited in their SQ3R notebook and to reward subjects verbally by making encouraging remarks.

Session II:

SQ3R: Biology

Feedback:

- The therapist gave back to the subjects their SQ3R notebooks so that knowing their performance will reinforce further interest.

- General discussion about the subjects' assignment and performance was undertaken. The therapist ensured that subjects studied and reproduced diagrams as well as the notes.

Active Teaching:

Same as in previous sessions. Topic: Biology Study

Content IV - "Fertilization/Sex Determination" (Using Diagrams IVa & IVb and Charts IVa & IVb) was taught and given subjects as their home assignment to study, applying the SQ3R technique. (See Appendix A for details).

Subjects' notebooks were collected during the week and graded.

Week 8:

Session I:

SQ3R: English Comprehension

- The therapist gave subjects Practice Passage II "The Great Elephant Bird" (See Appendix A).
- Subjects were allowed to go on at their own pace in the application of the SQ3R steps. The therapist, however, went round to give assistance where necessary and to apply the various forms of reinforcements as in previous sessions.
- The therapist called the subjects' attention to the fact that they were free to apply the SQ3R technique to all the other subjects. They were then given some hints on how to maintain the use of the technique in natural context: avoid distraction; keep a free mind; if disturbed, look for a more suitable place of study, always apply self-

reinforcement and avoid procrastination.

Session II:

Biology

Feedback:

Subjects' SQ3R notebook were distributed to them.

- There was a general discussion about the assignment and subjects' performance. The therapist reminded the subjects not to leave out the diagrams but to reproduce them or label already drawn diagrams when they got to step IV "Recite" of the technique.
- Active teaching of Biology Study Content V: "Secondary Sex Characteristics/Family Tree" using Diagram V and Chart V to explain "Family Tree!"
- Subjects were told to study the Biology content from home applying the SQ3R technique.
- The therapist collected students' SQ3R notebook during the week for grading.

Week 9Session I:English Comprehension:

- The therapist gave out to the subjects Practice Passage III: "The Wrestlers".

- The therapist followed the same procedure as in Steps II & III of Week 8, Session I.

- The therapist placed great emphasis on subjects' use of the SQ3R technique in all the other subjects they study. Also, self-monitoring of the technique application was encouraged.

Session II:Biology

- The therapist followed the same procedure as in steps I - V of Week 8, Session II.

- The therapist encouraged the subjects to use the SQ3R techniques to study all their academic subjects and to report any difficulty encountered to the therapist for assistance. However, the therapist emphasized subjects' independent use of the technique.

Topic:Biology Content VI:

"Health and its Maintenance". Subjects' SQ3R notebooks were graded during the week and returned to them for effective feedback of their performance.

GROUP II - THE SUMMARIZATION TECHNIQUE (SEE APPENDIX B FOR THE FULL SUMMARIZATION PROGRAMME).

GENERAL ORIENTATION: 1 - 1½ hours

Week 3

(a) Objective:

The therapist met experimental group B, already screened into three ability groups - high, medium, low-in their class. The therapist went through the aims and objectives of the programme with them:

- (i) To help subjects acquire improved study habits.
- (ii) To help subjects improve their comprehension ability.
- (iii) To make learning more meaningful and interesting to subjects.
- (iv) Ultimately, to help subjects attain a high academic standard.

(b) Orientation:

The therapist distributed to the subjects the Summarization Explanation Handout and discussed it with the subjects:

- Awareness & Motivation
- Rationale
- Explanation: the Summarization technique.
- Self Reinforcement.

(See Appendix B for detailed General Orientation programme).

THE TRAINING SESSIONSWeek 4Session I:Summarization: Steps I & II

Step I: Pre-view the passage.

Step II: Read intensively.

Step I:

The therapist distributed the two books and the passage on which the pre-viewing training activities were based. The subjects were trained to pre-view the books and the passage.

Verbal Reinforcement was applied to encourage the subjects.

Step II:

The therapist trained the subjects to read intensively;

- She discussed the psychological preparation involved in intensive reading e.g., all materials needed are placed on the table and other items are kept away to avoid distraction, a quiet and conducive environment is needed etc.

Modelling:

- Reading intensively was modelled by the therapist.

Rehearsal:

- With pencils in hand to underline important points, the subjects had some rehearsal of intensive reading.

Self Reinforcement:

Subjects were encouraged to make some positive statements about their need and determination to adopt the Summarization technique. (See Appendix B, Week 4(I) for full detail).

Session II:

Summarization Steps I & II: Biology

- Using Chart I ("Digestion I") the therapist engaged in the teaching of Biology Study Content I: "Digestion I"

Subjects were encouraged to participate fully in the lesson and ask questions about points not understood.

Assignment:

Subjects were given copies of Study Content I and they were instructed to study the note at home applying the first two steps of Summarization learnt.

Week 5

Session I:

Summarization Step III: Search For the key points.

English Comprehension

- The therapist revised the assignment given and discussed with the subjects problems encountered in the application of the first two steps of summarization.
- The therapist trained the subjects to locate key points from the Reading passage: "Louis Pasteur"; she trained the subjects to locate key sentences at the beginning, middle or end of paragraphs.
- The therapist led the subjects to write the key points in Summarization Worksheet I.(See Appendix Di).

- The therapist applied Verbal Reinforcement as deserved by the subjects.

Session II:

Summarization Step III: Search for the key points

Biology

- The therapist again engaged in an active teaching of Biology Study Content II: "Digestion II", a copy of which was handed to each subject. With the aid of Chart II (Digestion II) the therapist gave a thorough explanation of the topic and she encouraged the subjects to participate and ask questions.
- The therapist then distributed copies of study Content II to the subjects to study from home applying the first three steps of Summarization learnt. Subjects were encouraged to get a "Summarization Notebook" in which to do the assignment.

Self-Reinforcement:

The therapist encouraged the subjects to utter some positive self-statements about their own achievement in the use of the technique so far and their persistent effort to ensure mastery over and use of the technique in its entirety.

Week 6Session I:

Summarization - Steps IV: Formulate Concise Statements
Statements and

Step V: Glance through the passage again.

English Comprehension

Step IV: Formulate concise statements

- The therapist first revised the previous assignment: Steps I, II & III of Summarization applied to Study Content II.
Token Reinforcement: Applied as before.

- Using Summarization Worksheet II, the therapist trained the subjects to make concise statements with the key points (See Appendix B for details).

- Verbal and Self Reinforcement: applied as before.

Step V: Glance through the passage again.

- The therapist led the subjects to look through the passage "Louis Pasteur" again to include missing points.

Session II:Biology

Summarization-Step IV: Formulate Concise Statements with the key points & Step V: Glance through the passage again.

- Active Teaching: the therapist used Chart IIIa & IIIb to teach the subjects Biology Study Content III: "Reproduction"

(See Appendix B). She explained the topic thoroughly and ensured subjects' full participation in the lesson.

- The therapist then distributed copies of Biology Study Content III to the subjects for home assignment; they were to study it applying all the five steps of Summarization learnt.

- The therapist collected the subjects' Summarization Notebook during the week to grade them for ready Feedback during the next session.

THE (SUMMARIZATION) PRACTICE SESSIONS

Week 7

Session I:

English Comprehension

- The therapist first revised the five steps of the Summarization technique with the subjects.

- The therapist then distributed copies of "Eze Learns a Lesson" to the subjects. The therapist monitored the step by step application of the Summarization technique by the subjects.

- Verbal Reinforcement:

The therapist issued encouraging remarks each time the students performed well.

Token Reinforcement:

- The therapist put a tick beside each step correctly applied.

Session II:

Biology

- The therapist gave subjects feedback about the last Biology assignment.

Active Teaching:

- The therapist undertook the teaching of Biology Study Content IV:

"Fertilization/Sex Determination (See Appendix B for details). Subjects were encouraged to take part and ask questions.

Assignment:

- Application of the Summarization technique to Study Content IV.

- Subjects' notebooks were collected and graded during the week in readiness for the next Biology session.

Week 8

Session I:

English Comprehension

- The therapist revised the five steps of Summarization.
- The therapist distributed Practice Passage II "The Great Elephant Bird" and she led the subjects to read and comprehend it using Summarization.
- Subjects were allowed to self-monitor the application of the technique but the therapist went round to give assistance where necessary.
- The therapist applied Verbal and Token Reinforcements as necessary.
- The therapist encouraged subjects to apply self - Reinforcement to boost their effort.
- The therapist then discussed with the subjects the strategies for maintaining the newly acquired technique in natural setting: avoid procrastination; keep a free

mind, study where there are no distractions etc.

Session II:

Biology

- The therapist gave the subjects some feedback on their performance in Study Content IV and she initiated a general discussion on subjects' use of the technique generally.
- The therapist emphasised subjects' reproduction of diagrams under step IV. Diagrams should not be skipped.
- The therapist taught Biology Study Content V: "Secondary Sex Characteristics/Family Tree".
- The therapist distributed copies of Study Content V to subjects for home assignment.
- The therapist collected subjects' Summarization notebooks during the week for marking and ready feedback during the next Biology session.

Week 9

Session I:

English Comprehension:

- Practice Passage III was distributed to the subjects ("The Wrestlers").

- Subjects were encouraged to study the passage using the Summarization technique. They were allowed to go on independently at their own pace as they applied the technique step by step. This was to ensure self-monitoring and self-sustenance at using the technique.
- The therapist, however, went round to give assistance and to give encouraging remarks in appreciation of subjects' efforts (Verbal Reinforcement) and to put a tick beside each correct application of the technique (Token Reinforcement).

Session II:

Biology

- The therapist followed steps 1 & 2 of Week 8, Session II.
- The therapist actively taught the subjects Biology Study Content VI: "Health and its Maintenance". Subjects were encouraged to take active part in the lesson and to ask questions.
- The therapist distributed copies of the Study Content to subjects to study from home applying the Summarization technique.

- The therapist emphasized the subjects' independent use of the Summarization technique when studying all the other subjects. They always referred any problem encountered in their application of the technique to the therapist.
- The therapist reminded the subjects to always take care of the diagrams under Step IV of Summarization.
- Subjects' Summarization notebooks were collected during the week, corrected and returned to them.

POST - TESTS

Weeks 10

Sessions I & II:

The therapist administered the comprehension tests (English & Biology) on all the subjects, both the experimental and the control groups. These were the same comprehension tests taken before the treatment commenced. Scores from these tests were used as the post-treatment scores.

Week 11

Sessions I & II:

(i) The therapist administered the Attitude tests (Attitude to English Comprehension and Attitude to Biology) on the

subjects both experimental and control, in the same way as it was done before the treatment commenced. This supplied the post-treatment scores of the subjects' attitude.

(ii) The therapist expressed appreciation for the subjects' co-operation and asked those in the control group to wait behind for their own briefing on "Study Techniques" at the end of session II.

CONTROL OF EXTRANEOUS VARIABLES

Some measures were taken to prevent extraneous variables from affecting the study. The therapist administered all the tests and handled the treatment programme personally to avoid any bias that might filter in through the involvement of any of the teachers. From the onset the therapist asked for a slight modification of the time-tables in the two schools used to avoid clashes and ensure the therapists' availability at the scheduled times.

The objective nature of all the Comprehension tests used and the diagrammatic nature of the Progressive Matrices

made it easy for subjects to want to spy each other, a situation which was prevented by ensuring that subjects sat reasonably far from each other and that invigilation was very thorough. Also, copies of all the tests were made available to each subject to avoid borrowing of test materials which could make the subjects influence each other's responses.

For the treatments, arrangements were made to have the two treatment groups and the control located in classrooms situated at a safe distance from each other to avoid subjects' interaction and contamination through exchange of ideas. The teachers were not given any access to the treatment programmes and they were not present during any of the treatment sessions so it was not possible for any bit of the techniques used to filter to the control group. Experimental subjects were provided with copies of the training and practice passages used, to ensure their effective participation in the programme. Also copies of the weekly Biology Study Contents were distributed to subjects to ensure subjects' full participation and prevent any irregularity arising from subjects' borrowing of notes from one another.

ANALYSIS OF DATA:

The effects of the independent variables on the dependent variables were determined by subjecting the data obtained in the study to statistical analysis.

The main effects of Robinson's SQ3R, and Summarization (on the rows) and high, medium, and low mental ability, (on the columns) on the comprehension ability of subjects were determined. Also, the interactive effects of the two treatments, Robinson's SQ3R and Summarization, and the levels of subjects' mental ability were investigated. In addition, the differential effectiveness of the two treatment programmes on the subjects of high, medium, and low mental ability were determined.

The analysis of co-variance (ANCOVA), invented by Ronald Fisher, was used because of its special advantages in increasing precision in randomized experiments. As Kerlinger (1973) explained, analysis of co-variance is a form of analysis of variance that tests the significance of the differences between means of final experimental data by taking into account the correlation between the dependent variables and one or more co-variates, and by adjusting initial differences in the experimental groups. Analysis

of Covariance corrects initial mean differences or variations in the pre-test measures between the experimental groups caused by inherent or environmental factors capable of staying through and influencing the experiment. Analysis of co-variance also reduces the effects of extraneous variations in the pre-test and post-test measures (Smith, 1957; Cochran 1957).

The 't'-test statistical analysis, using standard error of means, was used to investigate the differential effectiveness of independent variables.

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CHAPTER THREE
RESULTS AND CONCLUSIONS

This chapter on Results and Conclusions is organized in such a way that the hypotheses postulated in chapter I of this report might be tested. The hypotheses were tested one after the other, and the results are explained by reference to the tables.

HYPOTHESIS ONE:

This states that there will be no significant difference in the English Comprehension ability of subjects exposed to treatments (SQ3R and Summarization) and those in the control group.

Table 1 shows that there are significant statistical differences between treated subjects and those in the control group. The adjusted post-test mean scores for the ability groups for SQ3R and Summarization are generally higher than the post-test mean scores for the Control group. The higher the post-test adjusted mean scores, the higher the subjects' English Comprehension ability.

TABLE I

THE ADJUSTED Y-MEANS SHOWING THE EFFECTS OF TREATMENTS ON THE ENGLISH COMPREHENSION ABILITY OF SUBJECTS.

*Rows	** Columns								
TREATMENT PROGRAMMES	M E N T A L A B I L I T Y								
	High			Medium			Low		
	N	X-Means ***	**** Adjusted Y-means	N	X-Means	Adjusted Y-means	N	X- means	Adjus- ted
SQ3R	16	31.81	33.42	16	24.88	25.36	16	15.94	28.46
Summari- zation	16	29.50	29.20	16	24.63	30.13	16	16.44	24.40
Control	16	31.06	27.13	16	24.94	25.63	16	17.06	22.96
All	48			48			48		

* ROWS TREATMENTS

1. SQ3R
2. SUMMARIZATION
3. CONTROL.

**COLUMNS LEVELS OF MENTAL ABILITY

1. HIGH
2. MEDIUM
3. LOW

***X-MEANS REPRESENT PRE-TEST

****ADJUSTED Y-MEANS REPRESENT POST-TEST.

Like Table I, Table 2 also shows that the treatment strategies had significant effects on the subjects ($F = 20.56$; $Df 2/135$; $P < 0.05$). It also shows some statistically significant difference in the columns ($F = 29.14$ $Df 2/135$; $P < 0.001$). The interaction is also significant ($F = 12.35$; $Df 4/135$; $P < 0.05$).

TABLE 2

ANALYSIS OF COVARIANCE OF THE ADJUSTED Y-MEANS OF SUBJECTS' ENGLISH COMPREHENSION ABILITY.

Source of Variance	Sum of squares	Df	Means squares	F	P
* Rows	23.26	2	11.63	20.56	< 0.01
**Columns	32.97	2	16.48	29.14	< 0.01
INTERACTION	27.95	4	6.99	12.35	< 0.01
WITHIN	1221.707	135	0.571	-	-

*ROWS - Treatments

- 1 = SQ3R
 2 = SUMMARIZATION
 3 = CONTROL

** Columns - Grouping

- 1 - High Mental ability
 2 - Medium " "
 3 - Low Mental ability.

Table 3 shows that:

- (i) High mental ability subjects treated with SQ3R scored significantly higher than high mental ability subjects in the control ($t = 23.30$; $P < 0.001$; $df = 14$).
- (ii) High mental ability subject treated with Summarization scored significantly higher than the high mental ability subjects in the control ($t = 7.70$; $P < 0.001$; $df = 14$).
- (iii) Medium mental ability subjects treated with SQ3R were equal to the medium mental ability subjects in the control (' t ' = -1.00 ; $df = 14$; not significant).
- (iv) Medium mental ability subjects treated with Summarization performed better than medium mental ability subjects in the control ($t = 16.67$; $p < 0.001$; $df = 14$).
- (v) Low mental ability subjects exposed to SQ3R technique performed significantly better than the low mental ability subjects in the control group ($t = 20.35$; $P < .001$; $df = 14$).
- (vi) Low mental ability subjects exposed to Summarization performed significantly better than subjects of equal mental ability in the control group ($t = 5.33$; $p < .001$; $df = 14$).
- (vii) High mental ability subjects in the control performed significantly better than the medium mental ability subjects in the same control group ($t = 5.56$; $p < 0.001$; $df = 14$).

(viii) Medium mental ability subjects in the control group scored significantly higher than the low mental ability subjects in the same group ($t = 9.89$; $p < .001$; $df = 14$).

TABLE 3

INTER-TREATMENT GROUP t-TEST COMPARISON OF ROWS AND COLUMNS OF ADJUSTED Y-MEANS ON THE ENGLISH COMPREHENSION ABILITY OF SUBJECTS USING STANDARD ERROR OF MEANS

TREATMENT GROUPS	ADJUSTED Y-MEAN (1)	ADJUSTED Y-MEAN (2)	N	Df	't' OBSERVED	P
SQ3R (High) Vrs Control (High)	33.42	27.13	16	14	23.30	<.001
Summ. (High) Vrs Control (High)	29.20	27.13	16	14	7.70	<.001
SQ3R (Med) Vrs Control (Med)	25.36	25.63	16	14	-1.00	NS
Summ. (Med) Vrs Control (Med)	30.13	25.63	16	14	16.67	<.001
SQ3R (Low) Vrs Control (Low)	28.46	22.96	16	14	20.37	<.001
Summ. (Low) Vrs Control (Low)	24.40	22.96	16	14	5.33	<.001

LMS (LEAST MEAN SQUARE) = 0.57

POOLED S.E. (STANDARD ERROR) = 0.27

NOTE: High, Medium, Low refer to different levels of mental intelligence.

On the basis of the results contained in Tables 1, 2, & 3, hypothesis one is rejected.

HYPOTHESIS TWO:

Hypothesis two states that there will be no significant difference in the Biology Comprehension ability of treated (with SQ3R and Summarization) subjects and the control.

Tables 4, 5 shows that there are significant statistical differences between the subjects exposed to treatments and those in the control. The adjusted post-test mean scores for high, medium and low mental ability treated subjects generally indicate that the treatment had some significant effects (See Table 4). The higher the post-test adjusted mean scores, the higher the subjects' Biology Comprehension ability.

TABLE 4

THE ADJUSTED Y-MEANS SHOWING THE EFFECTS OF TREATMENT ON THE BIOLOGY COMPREHENSION ABILITY OF SUBJECTS.

* ROWS	** C O L U M N S								
TREATMENT PROGRAMMES	H i g h			Medium			L O W		
	N	X-means ***	Adjusted Y-means **** *	N	X-Means	Ajus- ted Y- mean	N	X-mean	Adjus- ted Y-mean
SQ3R	16	30.81	27.55	16	24.94	31.31	16	16.44	29.15
SUMMARIZ- ATION	16	29.63	34.43	16	25.13	30.92	16	17.44	26.97
CONTROL	16	31.00	26.66	16	25.00	25.82	16	16.44	23.02
ALL	48			48			48		

* ROWS: TREATMENTS:

1. SQ3R
2. SUMMARIZATION
3. CONTROL

** COLUMNS: LEVELS OF MENTAL ABILITY

1. HIGH
2. MEDIUM
3. LOW

*** X-MEANS REPRESENT PRE-TEST

**** ADJUSTED Y-MEANS REPRESENT POST-TEST.

Like Table 4, Table 5 also indicates, that the treatment strategies were effective ($F = 41.77$; $Df 2/135$; $P < 0.01$). However, the mental ability groups - high, medium, low-into which subjects were divided also had significant effects ($F = 15.49$; $Df 2/135$ $P/ 0.01$). Also the interaction between the rows and columns are quite significant ($F = 9.61$ $Df 4/135$ $P/0.05$). This shows that the mental ability of subjects is an important factor in the treatment and that the results achieved are not independent of the effects produced by the ability grouping: the interaction between the rows (treatments) and the columns (ability groups) having both combined to produce the results,

TABLE 5

ANALYSIS OF CO-VARIANCE OF ADJUSTED Y-MEANS OF SUBJECTS' BIOLOGY COMPREHENSION ABILITY.

Source of Variance	Sum of Squares	Df	Mean Squares	F	P
*ROWS	50.83	2	25.41	41.77	<0.01
** COLUMNS	18.86	2	9.43	15.49	<0.01
INTERACTION	23.40	4	5.85	9.61	<0.05
WITHIN	1314.316	135	0.61		

P / .05 SIGNIFICANT AT .05 LEVEL

*ROWS - TREATMENTS

- 1 = SQ3R
- 2 = SUMMARIZATION
- 3 = CONTROL

**COLUMNS - GROUPINGS

- 1 HIGH MENTAL ABILITY
- 2 MEDIUM MENTAL ABILITY
- 3 LOW MENTAL ABILITY

Table 6 (below) gives the following indication:

- (i) High mental ability subjects treated with SQ3R did significantly better than high mental ability subjects in the Control ($t = 3.18$; $P < .01$; $df = 14$).
- (ii) High mental ability treated with Summarization performed significantly better than the high mental ability in the control ($t = 27.75$; $p < .001$; $df = 14$).
- (iii) Medium mental ability subjects treated with SQ3R proved to be very much superior in performance to the subjects of the same mental ability in the control. ($t = 19.61$; $P < .001$; $df = 14$).
- (iv) Medium mental ability exposed to Summarization did significantly better than subjects of same mental ability in the control group ($t = 18.21$; $P < .001$; $df = 14$).
- (v) Low mental ability subjects treated with SQ3R performed significantly better than subjects in the same ability level in the control group ($t = 21.89$; $P < .001$; $df = 14$).
- (vi) Low mental ability subjects exposed to Summarization performed significantly better than subjects of low mental ability in the Control group ($t = 14.11$; $P < .001$; $df = 14$).

(vii) High mental ability subjects in the control group scored significantly higher than subjects with medium mental ability in the same treatment group ($t = 13.00$; $P < .001$; $df = 14$).

(viii) Subjects with medium mental ability in the control group performed significantly better than subjects with low mental ability in the same group ($t = 10.00$; $P < .001$; $df = 14$).

TABLE 6

INTER-TREATMENT GROUP t-TEST COMPARISON OF ROWS AND COLUMNS
OF ADJUSTED Y-MEANS ON BIOLOGY COMPREHENSION ABILITY OF
SUBJECTS USING STANDARD ERROR OF MEANS

TREATMENT GROUPS	ADJUSTED Y-MEANS (1)	ADJUSTED Y-MEANS (2)	N	Df	't' OBSERVED	P
SQ3R (High) Vrs Control (High)	27.55	26.66	16	14	19.61	<.001
Summ. (High) Vrs Control (High)	34.43	26.66	16	14	27.75	<.001
SQ3R (Med) Vrs Control (Med)	31.31	25.82	16	14	19.61	<.001
Summ. (Med) Vrs Control (Med)	30.92	25.82	16	14	18.21	<.001
SQ3R (Low) Vrs Control (Low)	29.15	23.02	16	14	21.89	<.001
Summ. (Low) Vrs Control (Low)	26.97	23.02	16	14	14.11	<.001

LMS (Least Mean Square) = 0.61
 POOLED S.E (Standard Error) = 0.28

NOTE: High, Medium, Low refer to levels of mental ability.

Based on the results contained in Tables 4, 5 & 6, to which references have been made, hypothesis two is rejected.

HYPOTHESIS THREE

Hypothesis three states: There will be no significant difference in the attitude to English Comprehension and Biology of subjects exposed to treatments (SQ3R and Summarization) and those not so exposed (control).

The results in Tables 7, 8 & 9 show that the SQ3R and Summarization techniques have been effective in improving subjects' attitude to English Comprehension and Biology. Table 7 shows that the adjusted mean scores, for high, medium and low mental ability subjects exposed to SQ3R, and Summarization were higher than the mean scores of the subjects in the control group. The higher the adjusted Y-means scores, the better the attitude of subjects.

TABLE 7

THE ADJUSTED Y-MEANS SHOWING THE EFFECTS OF TREATMENTS ON SUBJECTS' ATTITUDE TO ENGLISH AND BIOLOGY.

* ROWS	** COLUMNS								
TREATMENT PROGRAMMES	M e n t a l A b i l i t y								
	H i g h			M e d i u m			L o w		
	N	X-Means ***	Adjusted Y-means	N	X-Means	Y-Means ****	N	X-Means	Y-Means
SQ3R	16	80.19	86.56	16	79.75	87.73	16	77.75	84.42
SUMMARIZATION	16	78.63	86.56	16	77.56	85.43	16	79.94	84.41
CONTROL	16	80.56	79.97	16	80.44	83.14	16	79.75	82.73
ALL	48			48			48		

ROWS: TREATMENTS

1. SQ3R
2. SUMMARIZATION
3. CONTROL

LEVELS OF MENTAL ABILITY

1. High Mental Ability
2. Medium Mental "
3. Low " "

*** X-MEANS REPRESENT PRE-TEST

**** ADJUSTED Y-MEANS REPRESENT POST-TEST

Like Table 7, table 8 demonstrates the effectiveness of the two treatment strategies ($F = 10.96$; $Df = 2/135$; $P < 0.05$). Table 8 further indicates no statistical significant difference in the columns and no interactions.

TABLE 8

ANALYSIS OF CO-VARIANCE OF ADJUSTED Y-MEANS OF SUBJECTS' ATTITUDE TO ENGLISH & BIOLOGY.

Sources of Variance	Sum of Squares	Df	Mean Squares	F	P
* ROWS	28.56	2	14.28	10.96	< 0.05
** COLUMNS	4.38	2	2.19	1.68	(NS)
INTERACTION	9.55	4	2.39	1.83	(NS)
WITHIN	2815.31	135	1.30		

* ROWS = TREATMENTS:

- 1 = SQ3R
- 2 = SUMMARIZATION
- 3 = CONTROL

** COLUMNS = LEVELS OF MENTAL ABILITY:

- 1 = HIGH MENTAL ABILITY
- 2 = MEDIUM " "
- 3 = LOW " "

Table 9 gives the following results:

(i) High mental ability subjects exposed to the SQ3R technique scored significantly higher than the high mental ability subjects in the control group ($t = 35.69$, $P < .001$; $df = 14$).

- (ii) High mental ability subjects treated with Summarization technique scored significantly higher than subjects in the same ability level in the control ($t = 41.19$; $P < .001$; $df = 14$).
- (iii) Medium mental ability subjects exposed to SQ3R technique scored significantly higher on the attitude scale than subjects of the same mental ability level in the control group, ($t = 28.69$, $P < .001$; $df = 14$).
- (iv) Medium mental ability subjects treated with Summarization technique scored higher on the attitude scale than the untreated subjects in the same ability. ($t = 14.25$; $P < .001$; $df = 14$).
- (v) Low mental ability subjects scored higher on the attitude scale than low mental ability subjects in the control group, ($t = 10.56$; $P < .001$; $df = 14$).
- (vi) Low mental ability subjects exposed to Summarization scored significantly higher than subjects of equal mental ability in the control group ($t = 10.05$; $P < .001$; $df = 14$).
- (vii) Medium mental ability subjects in the control group scored significantly higher than high mental ability subjects also in the control group ($t = -19.81$; $P < .001$; $df = 14$).

(vii) Medium mental ability subjects in the control group performed better than low mental ability subjects in the same group ($t = 2.56$; $P < 0.05$; $df = 14$).

TABLE 9

INTER-TREATMENT GROUP t-TEST COMPARISON OF ROWS AND COLUMNS OF ADJUSTED Y-MEANS ON THE ATTITUDE OF SUBJECTS TO ENGLISH AND BIOLOGY USING STANDARD ERROR OF MEANS

TREATMENT GROUPS	ADJUSTED Y-MEANS (1)	ADJUSTED Y-MEANS (2)	N	Df	't' OBSERVED	P
SQ3R (High) Vrs Control (High)	85.68	79.97	16	14	35.69	<.001
Summ. (High) Vrs Control (High)	86.56	79.97	16	14	41.19	<.001
Control (High) Vrs Control (Med)	79.97	83.14	16	14	-19.81	<.001
Summ. (Med) Vrs Control (Med)	85.43	83.14	16	14	14.31	<.001
SQ3R (Low) Vrs Control (Low)	84.42	82.73	16	14	10.56	<.001
Summ. (Low) Vrs Control (Low)	84.41	82.73	16	14	10.50	<.001

L.M.S (Least Mean Square) = 1.30
Pooled Standard Error = 0.16

NOTE: High, Medium, Low refer to levels of mental ability.

On the basis of the results presented in Tables 7, 8, 9 hypothesis three is rejected.

HYPOTHESIS FOUR:

Hypothesis four states that there will be no significant difference in the comprehension ability of subjects exposed to the SQ3R and those exposed to Summarization techniques.

Tables 10, 11 & 12 show that the SQ3R technique is more effective in improving subjects' comprehension ability than Summarization technique.

Table 10 reveals adjusted Y-means of 33.42, 25.36 and 28.46 for the SQ3R high, medium and mental ability subjects as opposed to 29.20, 25.63 and 24.40 for the subjects exposed to Summarization.

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TABLE 10

THE ADJUSTED Y-MEANS SHOWING DIFFERENTIAL EFFECTIVENESS OF SQ3R AND SUMMARIZATION TECHNIQUES ON THE ENGLISH COMPREHENSION ABILITY OF SUBJECTS.

ROWS	COLUMNS								
TREATMENTS PROGRAMMES	M E N T A L A B I L I T Y								
	HIGH			MEDIUM			LOW		
	N	X-MEANS ***	ADJUSTED Y-MEANS ****	N	X-MEANS	ADJUSTED Y-MEANS	N	X-MEANS	ADJUSTED Y-MEANS
SQ3R	16	31.81	33.42	16	24.88	25.36	16	15.94	28.46
SUMMARIZATION	16	29.50	29.20	16	24.63	30.13	16	16.44	24.40
	32			32			32		

* ROWS: TREATMENT

1. = SQ3R
2. = SUMMARIZATION
3. =

** COLUMNS: LEVELS OF MENTAL ABILITY

1. = HIGH
2. = MEDIUM
3. = LOW

*** Y X-MEANS REPRESENT PRE-TEST

**** Y-MEANS REPRESENT POST-TEST

Table 11 presents an adjusted Y-means of 29.08 for the SQ3R technique and 26.41 for Summarization. This shows that the SQ3R technique had been more effective in improving the English Comprehension ability of subjects than the Summarization technique ($t = 9.89$ $df=94$ $p < .001$).

TABLE 11

t-TEST COMPARISON OF THE ENGLISH COMPREHENSION ABILITY OF SUBJECTS EXPOSED TO SQ3R & SUMMARIZATION TECHNIQUE.

TECHNIQUES	N	ADJUSTED Y-MEANS	LMS	POOLED S.E.	Df	OBSERVED 't'	P
SQ3R	48	29.08	0.57	0.27	94	9.89	<.001
SUMMARIZATION	48	26.41	0.57	0.27			

The inter-treatment comparisons done in Table 12(overleaf) yielded the following results:

(i) High mental ability subjects treated performed better than high subjects treated with Summarization. ($t = 15.59$; $P < .001$; $df = 14$).

(ii) Subjects of medium mental ability exposed to Summarization scored higher than subjects of the same mental ability exposed to SQ3R ($t = -17.67$; $P < .001$; $df = 14$).

- (iii) Low mental ability subjects exposed to SQ3R performed significantly better than low mental ability subjects exposed to Summarization ($t = 15.04$; $P < .001$; $df = 14$).
- (iv) Subjects of high mental ability exposed to SQ3R scored higher than subjects of medium mental ability exposed to the same treatment ($t = 29.85$; $P < .001$; $df = 14$).
- (v) Low mental ability subjects in the SQ3R treatment group performed better than medium mental ability subjects in the same group ($t = 11.48$; $P < .001$; $df = 14$).
- (vi) Subjects with medium mental ability exposed to Summarization scored significantly higher than high mental ability subjects exposed to the same treatment ($t = -3.41$; $P < .001$; $df = 14$).
- (vii) Subject with medium mental ability exposed to Summarization performed better than low mental ability subjects also exposed to Summarization ($t = 21.22$; $P < .001$; $df = 14$).

TABLE 12

INTER-TREATMENT GROUP 't'-TEST COMPARISON OF ROWS & COLUMNS OF ADJUSTED Y-MEANS ON THE COMPREHENSION ABILITY OF THE SQ3R AND SUMMARIZATION SUBJECTS, USING STANDARD ERROR OF MEANS

TREATMENT GROUP	ADJUSTED Y-MEANS (1)	ADJUSTED Y-MEANS (2)	N	DF	't' OBSERVED	P
SQ3R (HIGH) VRS SUMM. (HIGH)	33.42	29.20	16	14	15.62	<.001
SQ3R (MED) VRS SUMM. (MED)	25.36	30.13	16	14	-17.67	<.001
SQ3R (LOW) VRS SUMM. (LOW)	28.46	24.40	16	14	15.04	<.001
SQ3R (HIGH) VRS SQ3R (MED)	33.42	25.36	16	41	29.85	<.001
SUMM. (HIGH) VRS SUMM. (MED)	29.20	30.13	16	14	-3.41	<.001
SUMM. (MED) VRS SUMM. (LOW)	30.13	24.40	16	14	21.22	<.001

L.M.S. (LEAST MEAN SQUARE = 0.57

POOLED STANDARD ERROR = 0.27

NOTE: HIGH, MEDIUM, LOW REFER TO LEVELS OF MENTAL ABILITY.

On the whole, the SQ3R technique has proved to be more effective in improving the English Comprehension ability of subjects than Summarization technique. Therefore, hypothesis four is rejected.

HYPOTHESIS FIVE:

Hypothesis five states: There will be no significant difference in the Biology Comprehension ability of subjects exposed to SQ3R and exposed to Summarization techniques.

Tables 13, 14 & 15 present the results of the test of the above hypothesis: it is glaring that Summarization is more effective in improving the Biology Comprehension ability of subjects than SQ3R. Table 13 shows the adjusted Y-means of 27.55, 31.31, & 29.15 for the SQ3R high, medium and low mental ability subjects; and 34.43, 30.92 and 26.97 for the subjects treated with Summarization.

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TABLE 13

THE ADJUSTED Y-MEANS SHOWING DIFFERENTIAL EFFECTIVENESS OF SQ3R AND SUMMARIZATION TECHNIQUES ON THE BIOLOGY COMPREHENSION ABILITY OF SUBJECTS.

*ROWS	** COLUMNS								
TREATMENT PROGRAMMES	M E N T A L A B I L I T Y								
	HIGH			MEDIUM			LOW		
	N	X-MEANS * * *	ADJUSTED Y-MEANS * * * *	N	X-MEANS	ADJUSTED Y-MEANS	N	X-MEANS	ADJUSTED Y-MEANS
SQ3R	16	30.81	27.55	16	24.94	31.31	16	16.44	29.15
SUMMARIZATION	16	29.63	34.43	16	25.13	30.92	16	17.44	26.97
	32			32			32		

* ROWS: TREATMENTS

1. = SQ3R

2. = SUMMARIZATION

***X-MEANS REPRESENT PRE-TEST
 ****Y-MEANS REPRESENT POST-TEST

** COLUMNS: LEVELS OF MENTAL ABILITY

1. = HIGH

2. = MEDIUM

3. = LOW

In Table 14 is presented the adjusted Y-means of 29.34 for SQ3R technique and 30.77 for Summarization. Summarization has therefore proved to be generally more effective in improving the Biology Comprehension ability of subjects than SQ3R ($t = -5.11$; $P < .001$; $df = 94$).

TABLE 14

t-TEST COMPARISON OF THE BIOLOGY COMPREHENSION ABILITY OF SUBJECTS EXPOSED TO SQ3R & SUMMARIZATION TECHNIQUE

TECHNIQUES	N	ADJUSTED Y-MEANS	L.M.S.	POOLED S.E.	Df	OBSERVED 't'	P
SQ3R	48	29.34	0.61	0.28	94	-5.11	<.001
SUMMARIZATION	48	30.77	0.61	0.28			

Significant at 0.001 level.

The results of the inter-treatment comparisons done and presented in Table 15 indicated that:

(i) High mental ability subjects exposed to Summarization performed better than high mental ability subjects exposed to SQ3R ($t = -24.57$; $P < .001$; $df = 14$).

- (ii) Subjects of medium mental ability treated with SQ3R performed equally with medium mental ability subjects treated with Summarization ($t = 1.39$, not significant).
- (iii) Low mental ability subjects exposed to SQ3R scored significantly higher than low mental ability subjects treated with Summarization ($t = 7.79$; $P < .001$; $df = 14$)
- (iv) Subjects of medium level mental ability subjects exposed to SQ3R performed better than high level mental ability subjects exposed to the same treatment ($t = 13.42$; $P = .001$; $df = 14$).
- (v) Medium level mental ability subjects treated with SQ3R performed better than low level mental ability subjects treated with the same techniques ($t = 7.71$; $P < .001$; $df = 14$).
- (vi) High mental ability subjects exposed to Summarization performed significantly better than medium level mental ability subjects exposed to the same treatment ($t = 12.54$; $P < .001$; $df = 14$).
- (vii) Subjects of medium level mental ability treated with Summarization scored higher than the low mental ability subjects in same treatment group.

TABLE 15

INTER-TREATMENT GROUP 't'-TEST COMPARISON OF ROWS AND COLUMNS OF ADJUSTED Y-MEANS ON THE BIOLOGY COMPREHENSION ABILITY OF THE SQ3R AND SUMMARIZATION SUBJECTS USING STANDARD ERROR OF MEANS.

TREATMENT GROUPS	ADJUSTED Y-MEANS (1)	ADJUSTED Y-MEANS (2)	N	DF	't' OBSERVED	P
SQ3R (HIGH) VRS SUMM. (HIGH)	27.55	34.43	16	14	-24.57	<.001
SQ3R (MED) VRS SUMM. (MED)	31.31	30.92	16	14	1.39	NS
SQ3R (LOW) VRS SUMM. (LOW)	29.15	26.97	16	14	8.50	<.001
SQ3R (HIGH) VRS SQ3R (MED)	27.55	31.31	16	14	13.43	<.001
SQ3R (VRS SQ3R (LOW)	31.31	29.15	16	14	7.71	<.001
SUMM. (HIGH) VRS SUMM. (MED)	34.43	40.92	16	14	12.50	<.001
SUMM. (MED) VRS SUMM. (LOW)	30.92	26.97	16	14	14.11	<.001

L.M.S. (LEAST MEAN SQUARE = 0.61

POOLED STANDARD ERROR = 0.28

NOTE: HIGH, MEDIUM, LOW REFER TO LEVELS OF MENTAL ABILITY.

From the results presented in Tables 13, 14 & 15, Summarization technique has been more effective in improving the Biology comprehension ability of subjects. Hypothesis five is therefore, rejected.

HYPOTHESIS SIX:

Hypothesis six states that there will be no significant difference in the attitude to English Comprehension and Biology of subjects exposed to SQ3R and Summarization. Tables 16, 17 & 18 present the results of the test of this hypothesis: the subjects exposed to SQ3R exhibited better post-treatment attitude to English Comprehension and Biology than the subjects exposed to Summarization.

Table 16 shows the adjusted Y-Means of 85.68, 87.73 and 84.42 for the SQ3R mental high, medium and low ability subjects; and 86.25, 85.43 and 84.41 for the high, medium and low mental ability subject treated with Summarization.

TABLE 16

ADJUSTED Y-MEANS SHOWING THE EFFECTS OF DIFFERENTIAL EFFECTIVENESS OF SQ3R AND SUMMARIZATION TECHNIQUES ON SUBJECTS' ATTITUDE TO ENGLISH AND BIOLOGY.

*ROWS	**COLUMNS								
	M E N T A L A B I L I T Y								
	HIGH			MEDIUM			LOW		
TREATMENT PROGRAMMES	N	*** X-Means	**** ADJUSTED Y-MEANS	N	X-MEANS	ADJUSTED Y-MEANS	N	X-MEANS	ADJUSTED Y-MEANS
SQ3R	16	80.19	85.68	16	79.75	87.73	16	77.75	84.42
SUMMARIZATION	16	78.63	86.56	16	77.56	85.43	16	77.94	84.41
	32			32			32		

* ROW TREATMENTS

1 = SQ3R

2 = SUMMARIZATION

*GROUPS

1 = HIGH MENTAL ABILITY

2 = MEDIUM " "

*** X-MEANS REPRESENT PRE-TEST

**** Y-MEANS REPRESENT POST-TEST

Table 17 presents the Adjusted Y-means of 85.94 for SQ3R and 85.36 for Summarization. The indication is therefore given that SQ3R had been slightly more effective in improving subjects' attitude to English Comprehension and Biology than Summarization ($t = 3.63$; $P < .001$).

TABLE 17

t-TEST COMPARISON OF THE ATTITUDE TO ENGLISH COMPREHENSION AND BIOLOGY OF SUBJECTS EXPOSED TO SQ3R AND SUMMARIZATION

TECHNIQUES	N	ADJUSTED Y-MEANS	L.M.S.	POOLED S.E.	Df	Observed 't'	P
SQ3R	48	85.94	1.30	0.16	94	3.63	<.001
SUMMARIZATION	48	85.36	1.30	0.16			

Sig. at .001 level.

Inter-treatment comparisons were done and the results are shown in Table 18:

(i) High mental ability subjects treated with SQ3R exhibited better post-treatment attitude than high mental ability subjects treated with Summarization ($t = 5.50$; $P < .001$; $df = 14$).

- (ii) The SQ3R subjects with medium level mental ability scored significantly higher in post-treatment attitude test than students with the same level of mental ability treated with Summarization ($t = 14.44$; $P < .0.05$; $df = 14$).
- (iii) Low mental ability subjects exposed to SQ3R exhibited equal attitude as the low mental ability subjects exposed to Summarization ($t = 0.06$; not significant).
- (iv) Medium level mental ability subjects exposed to SQ3R scored higher in attitude than high mental ability subjects exposed to the same treatment ($t = 12.81$; $P < .001$; $df = 14$).
- (v) Medium level mental ability subjects treated with SQ3R scored higher in attitude than low mental ability subjects exposed to the same SQ3R treatment ($t = 20.69$; $P < .001$; $df = 14$).
- (vi) High mental ability subjects treated with Summarization scored significantly higher in attitude than medium level mental ability subjects exposed to the same treatment ($t = 7.13$; $P < .00$; $df = 14$).
- (vii) Medium level ability subjects exposed to Summarization scored significantly higher than low mental ability subjects in the same treatment group ($t = 6.31$; $P < .001$; $df = 14$).

TABLE 18

INTER-TREATMENT GROUP 't' COMPARISON OF ROWS & COLUMNS OF ADJUSTED Y-MEANS ON THE ATTITUDE TO ENGLISH & BIOLOGY OF THE SQ3R AND SUMMARIZATION SUBJECTS, USING STANDARD ERROR OF MEANS.

TREATMENT GROUP	ADJUSTED Y-MEANS (1)	ADJUSTED Y-MEANS (2)	N	DF	't' OBSERVED	P
SQ3R (HIGH) VRS SUMM. (HIGH)	85.68	86.56	16	14	-5.50	<.001
SQ3R (MED) VRS SUMM. (MED)	87.73	85.43	16	14	14.38	<.001
SQ3R (LOW) VRS SUMM. (LOW)	84.42	84.41	16	14	0.06	NS
SQ3R (HIGH) VRS SQ3R (MED)	85.68	87.73	16	14	12.81	z.001
SQ3R MED VRS SQ3R (LOW)	87.73	84.42	16	14	20.69	<.001
SUMM. (HIGH) VRS SUMM. (LOW)	86.56	84.41	16	14	13.43	<.001
SUMM. (MED) VRS SUMM. (LOW)	85.43	84.41	16	14	6.31	<.001

L.M.S. (LEAST MEAN SQUARE = 1.30

POOLED STANDARD ERROR = 0.16

NOTE: HIGH, MEDIUM, LOW REFER TO LEVELS OF MENTAL ABILITY.

Based on the results presented in Tables 16, 17, 18, hypothesis six is also rejected.

SUMMARY OF RESULTS

Based on the test of the six hypotheses, the following have emerged as the highlights of the results:

Hypothesis I:

There will be no statistically significant difference in the English Comprehension ability of the subjects exposed to the SQ3R and Summarization techniques and those not so exposed (control).

(i) There was a statistically significant difference in the English Comprehension ability of the subjects exposed to the SQ3R and Summarization techniques and in the control.

(ii) There was also significant difference in the columns (high, medium, and low mental ability) and significant interaction between the rows and the columns.

(iii) High mental ability subjects treated with SQ3R performed better than high mental ability subjects in the control just as the high mental ability subjects treated with Summarization performed higher, than subjects of equal mental ability in the control.

(iv) Medium mental ability subjects exposed to SQ3R performed equally with medium mental ability subjects in the control whereas the medium mental ability subjects exposed to

Summarization performed better than the medium mental ability in the control.

(v) Low mental ability subjects exposed to Summarization scored higher than the low mental ability subjects in the control just as the low mental ability subjects treated with SQ3R performed better than subjects of the same mental ability in the control.

It then means that both treatments were more effective with high and low mental ability subjects than medium ability subjects in improving their English Comprehension ability.

Hypothesis 2:

There will be no statistically significant difference in Biology comprehension ability of subjects exposed to SQ3R and Summarization techniques and those in the control.

(i) There was statistically significant difference in the Biology comprehension ability of subjects exposed to the two treatments and those in the control.

(ii) There was significant difference in the columns and the interaction between the rows and columns was also very significant.

(iii) The two treatments proved to be equally effective with subjects of high, medium and low mental ability in improving their Biology comprehension since the subjects in the three ability levels performed significantly higher than those in the control.

(iv) High mental ability subjects exposed to SQ3R performed lower in the post-test than the pre-test.

Hypothesis 3:

There will be no statistically significant difference in the attitudes to English Comprehension and Biology of subjects exposed to the SQ3R and Summarization techniques, and those in the control.

(i) There was statistically significant different in the attitudes to English Comprehension and Biology of subjects exposed to the two treatments and those in the control.

(ii) There was no significant difference in the columns and the interaction, too, was not significant.

(iii) Both treatments proved to be equally effective in improving the attitudes of subjects of high, medium and low mental ability.

Hypothesis 4:

There will be no significantly difference in the English Comprehension ability of subjects treated with the SQ3R and Summarization techniques.

- (i) Subjects treated with the SQ3R technique performed significantly better than subjects treated with Summarization technique.
- (ii) High and low mental ability subjects in the SQ3R group performed significantly higher than high and low mental ability subjects treated with Summarization.
- (iii) Medium level mental ability subjects exposed to Summarization, however, performed better than subjects in the same mental ability level exposed to SQ3R.
- (iv) Low mental ability subjects in the SQ3R group performed better than medium level mental ability subjects in the same treatment group.
- (v) In the same way, medium level mental ability subjects exposed to Summarization benefitted better than high mental ability subjects also in the Summarization group.

Hypothesis5:

There will be no significant difference in the Biology comprehension ability of subjects exposed to SQ3R and Summarization techniques:

- (i) Generally, subjects exposed to Summarization technique scored higher in Biology Comprehension than those exposed to

SQ3R technique.

(ii) High mental ability subjects treated with Summarization performed better than high mental ability subjects exposed to SQ3R.

(iii) Medium level mental ability subjects exposed to SQ3R responded in the same way as medium level mental ability subjects treated with Summarization.

(iv) Medium level mental ability subjects exposed to SQ3R responded better than high mental ability subjects exposed to the same treatment.

Hypothesis 6:

There will be no significant difference in the attitude to English Comprehension and Biology of subjects exposed to SQ3R and Summarization.

(i) Generally, subjects treated with SQ3R exhibited better attitude to English Comprehension and Biology than the subjects treated with Summarization.

(ii) Subjects of high and medium mental ability in the SQ3R group exhibited better attitude than subjects of equal mental ability in the Summarization group.

(iii) The attitude of low mental ability subjects in the SQ3R group was the same as the attitude of the low mental ability subjects in the Summarization group.

(iv) Medium level mental ability subjects in the SQ3R group exhibited better attitude than high mental ability subjects in the same treatment group.

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CHAPTER FOURDISCUSSION

The first section of this chapter briefly outlines the Limitations of the study. This is necessary because the findings and possible contributions of the present study are tenable only within the scope of the limitations. The later sections of this chapter deal with the Discussion of the Findings, Implications and Suggestions for further research.

Limitations of the Study:

The experiment took place within the normal school environment with the other students around and the other school programmes going on. It was therefore, not possible to conduct the experiment in a stimulus controlled environment.

In an experiment like this, inter-subject differences like the socio-economic background and other personality influences could not be totally removed. However, these differences were taken care of through the use of the analysis of co-variance, a statistical device capable of equating subjects by removing any initial differences among them. Also, the possible effects of extraneous variables

should be curbed by the design and procedure of the study so as to reduce to the barest minimum any possible contamination effects by the extraneous variables.

Discussion of Findings:

Two study techniques, Robinson's SQ3R and Summarization were used to improve subjects' comprehension. The results obtained have pointed to the great capacity of the two techniques in improving comprehension since positive improvements were achieved among the subjects as a result of exposure to the techniques.

The results obtained have proved right Brown's (1940/41) assertion that many failing students had poor study habits and that they could improve their scholarship by improving their study habit. Miller (1962) also found that many students lack effective study techniques and that it is an important cause of underachievement. Even within the Nigerian context, Unoh (1977) discovered that 80.5% of the secondary school students used for his study were terribly in need of study-reading skills. In the same vein, Medahunsi (1985), found that lack of effective study skills was one of the major causes of underachievement even at the

undergraduate level.

The findings of the present study, therefore, present some hope toward solving the problem of underachievement; if students' comprehension ability can be improved, ultimately their achievement would also improve. The results are here discussed hypothesis by hypothesis:

Hypothesis I:

There will be no significant difference in the English Comprehension ability of subjects exposed to treatments (SQ3R and Summarization techniques) and those not so exposed (control).

The results of the data in Tables 1, 2, and 3 indicate that there were differences in the English Comprehension ability of the treated subjects and those in the control group. The adjusted Y-means reflected a significantly higher score for the treated subjects. Some interpretations can be given to explain the success of the two techniques. In the first place, the treatment programme for each study technique was very extensive; it took into account Berg's (1966) finding that students do not learn automatically and that they need guidance and directions before they can engage in using study

skills. The behaviour modification approach and the reinforcements used might have encouraged the subjects to be well disposed toward learning the techniques and persisting to the end so that they reaped the ultimate benefit of the techniques. For example, the fourth step of SQ3R "Recite" and the fourth step of Summarization, "Formulate concise statements" proved somehow difficult for the subjects and only the consistent application of verbal and token reinforcements and feedback saw them through. This then can be regarded as another instance proving the efficacious use of reinforcement in inculcating desired behaviour in subjects.

Another possible explanation is that during the treatments subjects were given adequate facility to make for their full and effective participation in the treatment sessions. Copies of the passages used for the training and practice sessions were provided for the subjects. This could be responsible for the stimulation and sustenance of the subjects' interest throughout the treatment sessions.

Moreover, English Comprehension is an important section of English Language, a compulsory subject for J.S.S. III examination. It is a subject with which many students have

difficulty, possibly because it occupies a second language position in Nigeria. Any attempt to improve performance in such a subject should be highly welcomed by the subjects. This is a plausible way to explain the cooperation, commitment and full participation which the subjects accorded the programme throughout the treatment sessions.

During the treatment period, subjects were encouraged to use the SQ3R and Summarization techniques freely when studying all their academic subjects. Strategies for maintaining the newly acquired behaviour in natural setting were discussed with the subjects. Also, some self-monitoring and self-sustenance techniques were inculcated so that subjects could use the new study formulae without any supervision from the therapist. It is possible, therefore, that in their wide use of the SQ3R and Summarization techniques subjects realized their usefulness in improving comprehension and in getting them to be better prepared for class quizzes. Such realization in itself could be a reinforcing factor enhancing further the success of the techniques.

It should also be mentioned that the comprehension passages used for both the training and practice sessions all had African background and dealt with topics relevant

to the subjects' experience. The fact that they all emerged from the subjects' class textbooks ensured that the passages' difficulty level was just adequate for the subjects. These, too, could be contributory factors to the success of the techniques.

The main finding in Hypothesis I proved that subjects' comprehension ability and study habits can be improved if they are exposed to effective study techniques. This finding corroborates Goldman's (1978) finding that students involved in a study skills programme gained better grade point averages. It is also in consonance with the finding that a combination of study skills training with some behaviour modification techniques was effective and superior in improving academic performance (Mitchell & Mg, 1972; Lent & Russell, 1978). There is a close agreement between the present finding and the findings of Entwistle (1960) and Entwistle & Entwistle (1971) that there is a positive relationship between study skills courses and improvement in students' grades.

Brown (1965) also obtained a similar result when he mounted a study skills guidance programme for a set of students who earned significantly higher scores. The

present finding is also in line with Bakare's (1975) finding of positive correlation between academic attainment and efficient study habits.

Another important aspect of the findings in Hypothesis I is the significant interaction effects obtained between the rows and the columns. This indicates that the results obtained were not independent of the effects produced by the ability grouping, because the interaction between the rows (treatments) and the columns (ability groups) have both combined to produce the results. This means that mental ability should be recognized as an important factor when training subjects to use the study skills. Both the SQ3R and Summarization techniques were more effective with high and low mental/subjects than with medium mental ability subjects. High mental ability subjects gained more from the treatment possibly because their high mental capacity assisted, more so since comprehension, an important language skill, was involved. The low mental ability subjects possibly realized their inadequacy from the beginning and so made additional efforts to benefit from the programme.

This finding about the effect of mental ability on subjects' response to the treatments corroborates Dimichael's

(1953) finding that mental ability affected the outcome of study skills training. It contradicts the finding that underachieving students believed that improved methods of studying are beyond their control and actually found it difficult to change (McCreynolds & Church, 1973). The present finding, however, corroborates Burnett's (1952) report that the study techniques of superior students are essentially the same as those of other students.

Hypothesis 2:

There will be no significant difference in the Biology comprehension ability of subjects exposed to SQ3R and Summarization techniques and those in the control group.

The data presented in Tables 4, 5 and 6 show that the subjects treated with SQ3R and Summarization scored higher in Biology comprehension than the subjects in the control group. One explanation for the success recorded here may have to do with the important position which Biology occupies among secondary school students as the only science subject usually offered by both the Arts and Science students. It is compulsory for even the Arts students to offer at least one Science subject; most students consider Physics, and Chemistry as prohibitive because many schools are

inadequately staffed and poorly equipped for teaching of physical sciences (Chidolue, 1983). Many students are then left with no other alternative than to offer Biology since it is compulsory for the Science students and it is the only Science subject which the Art students can manage. The results being that enrolment in Biology is usually very high even though performance in the subject is usually poor yearly. And study improvement programme therefore on such important subject will be highly welcomed by the subjects. This may explain why they were highly responsive, and the consequent success of the treatments.

In addition, the execution of the SQ3R and Summarization programmes fell in line with the inquiry approach advocated by the new science curricula, which involves the wide use of repertoire of behaviours in the classroom such as stimulating students to identify problems, making observations, asking questions, participating in classroom discussions (Lazarowitz, 1978). During the treatment, charts, diagrams and notes were also made available and personal copies were provided the subjects. The emphasis was on subjects' full participation and critical thinking. All these might have stimulated subjects' interest and enhance their

understanding. Yager and Wick (1966) found that students' understanding of science was greatly affected by the methods of presentation. This is a possible explanation for the success of the treatments with the subjects.

The replication and study of diagrams in Biology, prove very difficult for many students. Both the SQ3R and Summarization techniques, however, devoted attention to easy handling of diagrams by subjects. This might have increased subjects' responsiveness to the techniques.

Moreover, the Biology topics treated were very personal and relevant to subjects' lives. Topics like "Digestion" and "Reproduction" could be very intriguing to the J.S.S. III subjects, most of whom were in the adolescent stage and were currently experiencing some of the secondary sexual characteristics discussed. Such direct bearing of the topics to the subjects' lives might have led to personal commitment and the consequent success of the study skills programmes applied to the topics.

The present finding of improved performance as a result of study skills training corroborates Berg and Rentel's (1966) finding that students who enrolled in study skills course raised their grade point averages. Weigal

and Weigal's (1963) discovery that the use of study skills by freshmen correlated with academic achievement is in line with the present finding. In consonance with the result of this study, improved academic performance had been attributed to changes in approaches to study (Katahn, Strenger & Cherry, 1967). Harris & Trujillo (1975) also obtained a similar result when their subjects reported improvement in their academic abilities and admitted that a study programme they underwent had increased their efficiency and time spent studying. Also in line with the findings of this study is Allen's (1971) and Mitchell et al's (1975) reports that a combination of study skills training and systematic desensitization was effective and superior in improving academic performance.

The significant interaction obtained between the rows (treatments) and the columns (levels of mental ability) indicated that the mental ability of the subjects was an important factor in the result obtained, perhaps because of the high intellectual nature of Biology with various diagrams. The intellectual capacity of the subjects will therefore come to play in their receptiveness and responsiveness to the treatment. Some studies have equally found that

subjects' achievement level affected their disposition to study programmes (Beneke & Harris, 1972). Perhaps, this is the only way in which one can explain the rather surprising finding in the study; the high mental ability subjects exposed to the SQ3R treatment performed poorer in the post-test than in the pre-test! This can be attributed to some human factors in the subjects: may be these high mental ability subjects felt rather over-confident and were so sure of their performance that they felt no need for the acquisition of any study technique. Possibly, they viewed the therapist's effort to make them acquire the study technique as a sheer waste of their time, and so handled the post-test with so much levity that they performed poorer in it than the pre-test.

Hypothesis 3:

There is no significant difference in the attitude to English comprehension and Biology of subjects exposed to SQ3R and Summarization techniques and those in the control group.

Results of data presented in Tables 7, 8 & 9 show that the subjects who were exposed to SQ3R exhibited better attitude toward English Comprehension and Biology than those not so exposed. Since the new techniques proved effective in improving subjects in the cognitive area, it was then likely that the disposition of the students to the two subjects would improve hence the gain realized in the effective area. Specifically, the teaching behaviour of the therapist, who undertook an active teaching of Biology, was directed at stimulating the interest of the subjects and inculcating inquiry attitude in them. This is capable of engendering more favourable attitude in the subjects. Mintzes (1982) found strong relationship between students'

perceptions of the "information-transmitting" behaviour of the teacher and students achievement.

Also, the use of interesting passages, moderately challenging, and with African background ensured that subjects had full participation during the English Comprehension sessions, more so as individual copies of the passages were provided for them. Moreover, the usual general negative attitude of students to science was borne in mind by the therapist. For example, Newton (1975) reported that the attitude of subjects to science was generally negative, and Bohardt (1975) found a deterioration of positive attitude toward science classes beginning at the 6th grade level and extending through the junior high school. The therapist therefore realized right from the beginning that enlisting the subjects' interest in Biology was a great task, which was accomplished not only by making the Biology lessons and teaching interesting but also by making available relevant charts and diagrams, and by providing subjects with individual copies of such materials. All these interest-sustaining measures were also capable of bringing about improvement in subjects' attitude toward Biology.

In addition, the intensive nature of the treatment programmes made possible repeated exposure of subjects to

English Comprehension and Biology, and to the study techniques, a practice which, according to Zajonc (1968a), is very much attitude-enhancing. Attitude helps to determine the extent to which the learner will be disposed to acquire a specific learning task (Bloom, 1976).

The findings of the present study corroborates Ogunlade's (1981) report that behavioural group counselling led to the modification of study attitude. The results obtained also support Hough's (1982) analysis that there was a significant relationship between achievement and pupils' attitude. Ignoffo (1988) obtained a similar result as he reported some improvement on subjects and vocabulary skills, as a result of improvement of attitudes.

Moreover, the two school subjects used for the study, that is English Language and Biology, are compulsory for the J.S.S. III examination. This in itself is an important factor capable of increasing the subjects' commitment to any psychological treatment involving the two compulsory subjects. Such commitment is capable of enhancing subjects' attitude towards the treatment and of ensuring consequent post-treatment gain in attitude. The achievement of such post-treatment attitude gain contradicts Mitchell & Simpson (1982)

who found that while gains in scores in Biology were significant beyond the 0.01 level of probability, changes in attitude scores were not; that is, only students' cognitive behaviour was changed during a planned introductory biology course while their attitudes either stayed the same or became slightly more negative.

It is remarkable, however, that no significant interaction effect between the rows and the columns was obtained. This is because attitude comes under the affective domain which operates independent of the intellectual capacity of the subjects. Affective gain can be achieved without any recourse to mental ability as an important factor. This aspect of the findings, however, contradicts Kalejaiye (1977) who reported that brighter children tended to have more positive attitudes towards school subjects than weak ones.

Hypothesis 4:

There will be no significant difference in the English Comprehension ability of subjects exposed to the SQ3R and Summarization techniques.

The data presented in Tables 10, 11 & 12 indicate that the subjects exposed to the SQ3R technique scored higher in

English Comprehension than those exposed to Summarization technique. One possible way of explaining the SQ3R subjects' better performance over the Summarization group is tied up with the difficulty often reported in the act of summarizing. Even though the therapist broke down the activities involved into small steps and applied behaviour modification techniques and reinforcement to ease subjects' difficulty, the subjects still found steps 3 & 4 of Summarization rather tasking. "Searching for the key points" and "Formulating concise statements with the points" were not very easy tasks to accomplish.

Carr & Ogle (1987) reported that many secondary school readers are unaware of basic techniques such as identifying key ideas which is basic to summarizing. Also Unoh (1982) identified as one of the reading problems typical of secondary school students, the difficulty in distinguishing main ideas from relevant or irrelevant details and difficulty in reading for gist. This situation may explain the advantage which the SQ3R had over the Summarization group.

Concerning the SQ3R technique, even though Step 2 "Question" and Step 4 "Recite" are also somehow difficult to accomplish, the comprehension - enhancing capacity of Step 2

tended to compensate for the difficulty. Questioning, on its own, and at any point during reading, has been known to improve comprehension (Fraser, 1967). The quality and the rate of comprehension were improved through the use of questioning (Bruning, 1968). Miles (1967) and Fraser & Schwartz (1975) reported that questioning activities produced higher comprehension rate than just studying. Students' self-generated questions were discovered to be very important in enhancing reading comprehension (Singer, 1978; Dreher & Cambrell, 1985). Adejumo (1972) found that the use of students' guide questions aid comprehension and extension.

The effectiveness of SQ3R in improving English Comprehension corroborates Anyaegbunam's (1979) finding that many students who used the SQ3R method of studying gain much from their reading assignment. The finding is also in consonance with Jacobowitz's (1988) confirmation that the SQ3R technique is used for somewhat difficult learning task requiring in-depth processing. In line with the present finding is the report that the SQ3R technique was particularly helpful in the case of inadequate study effort (McCreynolds & Church, 1973). The finding in this study is similar to the finding of Briggs, Tosi & Morley

(1971) that subjects exposed to the SQ3R study technique demonstrated higher GPA. In the same vein, students receiving lessons in the use of SQ3R method showed significant gain in GPA for three semesters following the study (Beneke & Harris, 1972).

The present report about the effectiveness and superiority of SQ3R contradicts Bailey's 1988 verdict that he had tried the SQ3R approach without much success, and that students were reluctant to try it because they thought that it looked difficult and involved much work.

It is noteworthy that low mental ability subjects gained more from the SQ3R technique than medium mental ability subjects in the same treatment group. This bit of the finding corroborates Williamson's (1935) report that good students necessarily study no more but usually slightly less than poor students. It is also in consonance with the report that many of the good study habits examined were repeatedly being followed more exactly by inferior students than by better ones (Cuff, 1937).

Hypothesis 5:

There will be no significant difference in the Biology comprehension ability of subjects exposed to SQ3R

and Summarization techniques.

The data showing the results of the test of Hypothesis 5, shown in Tables 13, 14 & 15, show that the subjects exposed to Summarization performed better in Biology comprehension than those exposed to SQ3R. A possible explanation for this finding is that since the study of Biology involves diagrams, it might be easier to apply the various steps of Summarization to it. Step 3 "Search for key points" and Step 4 "Formulate concise statements" might not prove as difficult to apply as they were under English Comprehension since some of the statements to be formulated will necessarily be replaced by labelling or reproducing some diagrams.

Moreover, the subjects might have realized the special advantage which summarization has for note-taking subjects like Biology. Lengthy notes could be studied and reduced to manageable itemized points which will be found very useful for revision during examination. Summarization is also very useful to students when they read various textbooks and attempt to have a synopsis of the points read. This is highly essential these days when many students do not possess personal copies of many of the textbooks read, and they, more often than not, have to depend

on the libraries or on borrowing books from friends. Uwakwe and Aworh (1989) described summarizing as the process of condensing the essential information from a piece of writing into a unified group of sentences, containing the main ideas of the original selection.

The present findings about the effectiveness of summarization tallies with the finding of Dyer et al (1979) who discovered that more substantive information was acquired by the group who summarized as opposed to the group that completed a spatial relations task. The results of the present study also corroborates the finding that presenting summaries, and listening to oral summaries and comprehension aid recall (Ross et al, 1976). The finding is also in line with Garner's (1982) discovery that summary writing aids comprehension since he regarded what is included and what is omitted in a student's written summary as a mark of what has been understood from the text. Also, similar to the present finding is Brown & Day's (1983) report that making a summary helps to improve comprehension. The finding also falls in line with the result of Hare et al's (1984) study in which two versions of summarization intervention programmes (inductive and deductive) were designed

and the school students instructed about their use performed better than the other group. Taylor (1982) recorded similar success with his students who learned to improve their comprehension and recall of content material when they were trained to use a hierarchical summary procedure which directed students' attention to the organization of ideas in content textbook selections.

The present finding about the effectiveness of summarization over another study technique (SQ3R) contradicts Arnold (1942) who discovered no difference in the effectiveness of the techniques he used among which were underlining, outlining, simple re-reading and summarization.

Hypothesis 6:

There will be no significant difference in the attitude to English Comprehension and Biology of the subjects exposed to SQ3R and those exposed to Summarization techniques.

The result of the test of the above hypothesis showed that the subjects who were exposed to SQ3R exhibited better attitude to English Comprehension and Biology than those exposed to Summarization (See Tables 16, 17 & 19). The better attitude which the SQ3R subjects showed toward their

school subjects can be explained in terms of the technique's applicability as noticed among the subjects. As earlier explained, the SQ3R technique was somehow easier and more practical for subjects to apply to both English Comprehension and Biology than summarization which many subjects found a bit tasking, and only the diagrams made its application to Biology a bit practical for the subjects. Even though checked and discouraged by the therapist, some lazy SQ3R subjects tried applying step IV of the technique ("Recite") mentally, without writing down the points whereas it was not possible at all under Step IV of Summarization ("Formulate concise statements with the key points") to dodge writing. As a result, the SQ3R subjects were better disposed to the technique and the school subjects than their summarization counterparts. This situation may explain why the SQ3R subjects exhibited better attitude than the Summarization subjects.

Another remarkable aspect of the result is that only the high and medium mental ability SQ3R subjects showed the noticed superiority in attitude in SQ3R over Summarization; the low mental ability subjects in the two treatment groups exhibited equal attitude. This shows that the attitude of the low mental ability subjects in the two study techniques was the

same once the general improvement in the attitude of the treated subjects over the untreated (control) was achieved. This aspect of the result corroborates Kalejaiye's (1977) finding that brighter children tended to have more positive attitudes toward school subjects than weak ones.

The general acquisition of a more positive attitude to academic work as a result of exposure to study techniques is in consonance with Akinboye (1974) who found that subjects whose study habits were modified changed their belief that academic task was difficult. In line with the finding is the report that contract method of teaching with a study skills course proved more effective as students who were exposed to the study skills course reported positive attitude change toward study (Goldman, 1978). Ogunlade's (1986) finding is similar to the finding of the present study: giving experimental and control groups pre-and post-tests of attitude, Ogunlade found that the obtained improvement came as a result of the group counselling given to assist students to improve their attitude to "dreaded" and "difficult" subjects.

The general improvement of students' performance in academic subjects as a result of improvement of attitude to

the subjects corroborates other studies which reported significant positive associations between attitude and achievement (Gross, 1962; Nielson, 1978). Similarly, Fenneman (1973) used attitude toward courses as one of the variables that consistently predicted achievement levels of high school Mathematics and language students. Also in line with the present result is the discovery that learning Economics is significantly associated with students' performance on test of understanding Economics (Johnson and Adams, 1974). The present finding also agrees with Oyetunde (1986) who found some correlation between attitude to and achievement in English.

A study whose finding contradicts present finding is Johnson's (1968) report that significant difference in total recalled comprehension could not be traced to differences in attitude.

Implications of Findings:

The study has found out that exposure of students to study techniques improved their comprehension ability. The subjects who were exposed to SQ3R and Summarization improved significantly in English Comprehension and Biology.

The treated subjects also exhibited better attitude to their academic work than the control group. To achieve these results, reinforcement and some other behaviour modification techniques like shaping, modelling, rehearsal and active directive teaching were employed.

The results of the study have directed attention to some gaps that need to be bridged in our educational system. First and foremost, there is the great need to provide secondary schools with some educational guidance which will have as the core of its programme improvement of students' study skills. Akinboye (1977) found out that most students need some sort of psychological support in order to overcome their study habit problems. The rationale behind this has been proved by the present and various other studies: if students possess good study habits, they will use the time spent on their studies very wisely and achieve better results. Possessing effective study skills can lead to improved attitude towards academic work, and to improved performance still.

In fact, courses on how to study proved so positive that it was recommended to be part of the curriculum (Azpurua-Arrillaga, 1966). Such a recommendation is also

relevant to the Nigerian educational situation. There is a great need to train teachers, not only to understand the relevance and need for improved study skills but also be able to take students successfully through study skills programmes. Teachers should actually be practically involved and possess positive awareness which goes beyond knowing the steps of a strategy to attaining a deeper understanding of why it works in terms of cognitive theory (Jacobowitz, 1988). Faculties of Education in Universities and Colleges of Education really need to emphasize the study improvement aspects of their educational guidance programmes so that teachers will be able to give the necessary assistance to students in secondary schools.

Also, the teaching of comprehension in secondary schools deserves some focus. Since efficient comprehension is needed for good academic performance (Longe, 1979) and slow reading comprehension rate was one of the reading problems typical of secondary school students (Unoh 1980; 1982), it then goes without saying that steps should be taken to improve students' comprehension ability. Much of what goes on in the schools in the name of comprehension has come under heavy criticism. Comprehension is not achieved through the common question and

answer sessions usually embarked upon by some teachers and textbooks. At best such can pass for assessment of how much the students have comprehended rather than comprehension instruction and strategies. More recent views of teaching comprehension emphasize active student involvement and participation such as retelling, recalling, locating, predicting, summarizing and paraphrasing (Rakes and Smith 1987).

Most teachers ask direct literal comprehension questions rather than inferential or interpretive questions. Students too get used to answering such questions which only scratch comprehension on the surface. Teachers should not assume that students already know how to read and study for comprehension. They should be able to take students through comprehension-enhancing techniques like the ones used in the present study and some others like Tussings (1962) PAT, Unoh's (1969) 3S3R, and Bailey's (1989) S-RUN. Fowler (1982) suggested using frames to guide students' responses to comprehension questions and to help them provide better answers and develop independent comprehension skills. Paragraph frames which provide a structure for organizing a students' written response to a variety of content materials have been recommended (Nichols, 1980). To

promote story comprehension and enjoyment among smaller children, Galda (1982) suggested discussion and dramatic plays.

The present study finds that improved attitude to a subject leads to better performance in the subject. It seems relevant, therefore, to endorse a practical approach to the teaching of science so as to improve students' attitude to science subjects. It has been pointed out that much more effort needs to be concentrated on fostering desirable attitudes toward science and the teaching of science (Lucas, 1982). Charts and diagrams should be used to stimulate students' interest and aid comprehension. This becomes more pertinent if the present-day emphasis on development of science and technology is to be worthwhile.

There is the great need to inculcate useful general reading skills in students right from the primary school so that by the time they get to the Junior Secondary School it will be easy to train them in the use of study techniques. The preparation of the teachers who will train the students should emphasise both the academic and psychological areas of learning. Teachers should possess some skills in the application of behaviour modification techniques and reinforcement which will aid their students to learn more effectively. Adesemowo (1987) suggested that teachers should be exposed to In-Service Training and workshop experiences where they can acquire simple behaviour modification techniques and psychological strategies to assist students to learn more effectively.

Emphasis should also be placed on the important role which parents can play in ensuring that students show positive attitudes to home assignments. As far back as 1916, Brooks found that children generally do well when their parents are capable of guiding them and are also inclined to supervise the home study; he also found that children with disinterested parents in poor home environments tended to have trouble in their school work. Parents should show interest in their ward's study activities and provide them with time and suitable environment to accomplish their study tasks.

In conclusion, the findings of the present study should be of interest to teachers, parents, guidance counsellors, educationist generally, and policy-makers, as it called attention to the part each can play in helping students improve their academic performance through improvement in their study techniques.

Suggestion for Further Researches

The study looked into the improvement of students' comprehension ability through the acquisition of two study techniques: Robinson's SQ3R and Summarization. SQ3R attracted the researcher because of the often reported difficulty which

previous researchers had in using the techniques on students and because studies involving SQ3R and a science subject is very scarce. Summarization was studied because of the scarcity of studies involving the technique. Further researches could be done by comparing the effectiveness of SQ3R or Summarization with any of the other study techniques like Pauk's OK4R, Tussing's PAT, Unoh's 3S3R, The ERICA Programme, Bailey's S-RUN and Simon's PSRT.

Also, a fertile area for further research is to look into any possible sex difference that exists in the use of Robinson's SQ3R and Summarization, an aspect which ^{the} present study did not cover. It is also possible to see what general effect is created on subjects' academic performance as a result of the use of any of the two techniques to improve comprehension.

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APPENDIX A:THE SQ3R TREATMENT PROGRAMME (FOR GROUP I).WEEK 3: SESSION 3 (FOR WEEKS 1&2 SEE TREATMENT PACKAGE
GENERAL ORIENTATION -1- 1½ HOURS UNDER CHAPTER 2).1. Awareness and Motivation

It has been observed that many of you students achieve low in your academic work. It may not be correct to say that this happens because you are lazy. Many of you address yourself squarely to your books but yet you achieve poorer results than you expect. A major cause of such poor outcome after much input is deficient or inappropriate study habit. One may read for several hours; without applying the correct study technique, little will be achieved. Yet everybody knows the importance of success to a student's life. For example, you would love to be gradually promoted to higher classes so that at the end of your secondary school course, you can gain admission into higher institutions of learning, and pursue a career of your choice.

This is the more reason why you have to be helped to maximize achievement and get positive results from any effort you make. One way of doing this is to acquire

training in the use of effective study techniques which, if well mastered and applied to your studies, will make learning more interesting to you, and yield good results. One of such techniques is Robison's SQ3R which can be used to handle all your subjects to make them more meaningful and easy for you to learn, understand, remember and pass very well during examinations.

I have no doubt, that you would want to acquire the technique to benefit from its advantages. All that will be necessary for you to do is to be ready to learn the technique and persist until you master it very well so that you can apply it to all your subjects. As of now, training in the use of SQ3R will be given you in English Comprehension and the Biology aspect of Integrated Science. After mastering the technique, it will not be difficult for you to transfer the knowledge to other subjects. You will then be proud of having learnt a fruitful and rewarding study technique.

On my own part, I shall be ready to give all the training required and make everything as interesting as possible.

2. Rationale

The SQ3R study formula is designed by F.P. Robinson in 1961 to make study more effective. Going carefully through each of the five steps of the technique ensures good understanding of what is read. You will agree with me that understanding is basic to the acquisition of knowledge and in ensuring success in any study assignment.

Moreover, questioning which is a major sub-skill in the SQ3R technique has a special advantage; it usually makes examination questions look familiar since some of the headings turned into questions are usually the ones emphasized in examinations.

Are you ready to learn the study technique?

Explanation: What is SQ3R?

Each letter of the word stands for each step involved in the technique: Survey, Question, Read, Recite and Review. (The therapist writes the formula and its meaning on the chalkboard). These steps are abbreviated as SQ3R to make it easy for you to remember. In short, the five steps - survey, question, read, recite and review - should be applied to any work you wish to study. Let us go through

the steps:

Step I: Survey:-

The first thing to do to any reading piece or study material is to have a general survey of the piece by glancing through the main heading, the first paragraph, the sub-headings, the underlined or italicized words, if any, and the concluding paragraph. If it is a book, you should first flip through the pages especially the preface, the content pages, the introductory pages, the chapter headings, and the concluding pages.

In this way you will have a general idea of what the assignment contains, it will also be possible for you to get prepared to organize the ideas as you later read them. This length of the assignment. Mind you, this is not the actual reading of the passage but a mere quick estimate of what it is all about.

Step II: Question:-

You now have to form questions in your mind about what you have glanced through. Turn the main heading and the sub-headings into questions. Ask how? what? where? and why? about what you have glanced through. This will help

to fire your curiosity and lead to increased comprehension. You can also read through the questions asked at the end of the, assignment so as to direct your reading later to certain key points. This step will demand conscious effort on your part. However, with training it can be done with ease. Having done this you are now ready for the actual reading.

Step III: Read(R1):-

You will now do the intensive reading of the assignment. This is not just reading, it is reading with full concentration. You have to read with an inquiry mind to answer the questions you have raised in Step II. This type of reading is different from the way you read novels or story books. You really have to address your attention and effort to the work at hand so as to ensure full and lasting comprehension. Do such reading where you know you will not be disturbed at all. You are free to use a dictionary, a map, diagrams, or any reference book to aid your reading. Don't skip graphs, diagrams and illustrations; you have to master them very well.

In your reading, enter fully into the world of the writer and be so much highly involved that it becomes a

part of you. You should really comprehend the reading to the extent that you can refer to the content and talk about it freely even after the reading is over. This is how to read efficiently for examination purpose. Pay particular attention to italicised words, phrases, and clauses which are usually used to emphasise important terms and concept.

Step 4: Recite (R2):-

Having completed the thorough reading of the assignment you will now turn away from the passage and recite the facts read. Can you tell yourself the substance of the section you have just read? A very useful way of testing how much you comprehend what you have read is to teach it to someone else. Recitation in this context does not mean verbatim repetition of what you learn; it is the recalling of the substance of the passage, as much as possible in your own words. Don't be tempted to recite mentally only; your brain may deceive you; it is better to jot down the points in outline form. Note there is usually the temptation of wanting to read on and on without reciting. However, it pays to take each headed section or paragraph one by one and recite. Failure to stop and recite usually leads to

poor comprehension and poor memory later. If there are questions at the end of the assignment, this is the stage to attempt answering them. Reciting makes you know the points you have missed or the portion not understood.

Note that this is an important step that should not be omitted otherwise your study technique will be ineffective and your comprehension inadequate. Inability to recite the facts is an indication that Step III (Reading) has not been thoroughly done.

Step 5: Review (R3):-

This involves looking over the assignment or the note made to get the point that you could not recite. These are the points that have not been thoroughly understood. To review, go through the four steps of survey, question, read and recite taking the outline of the chapter or the various headings one by one. Go over the question you formed for each heading or the questions accompanying the passage and see if you can answer them. Re-read the part that you are unable to re-state or understand. Review should be done immediately after reading, and it should not be left until the examination period. This is the time to go through past examination questions based on the chapter

read in order to see how many of the questions you can answer. Any opportunity to discuss what has been read with other people should be seized.

4. Self-Reinforcement

Subjects should be made to reinforce themselves by making the following positive statements aloud:

"I need to improve in my academic work and pass my examinations.

I shall learn the SQ3R study formula.

I shall not give up until I master it thoroughly.

THE SQ3R TRAINING SESSIONS

(Weeks 4-6: 1-1½ hours for each sessions)

Week 4

Session I: English Comprehension:

SQ3R Stops I & II: Survey and Question (English Comprehension)

The therapist revised the five steps of SQ3R with the subjects: Survey, Question, Read, Recite and Review.

Step I: Survey:

- The therapist trained the subjects in the act of surveying by giving out to the subjects copies of *The Forest Is Our Playground* by M. Murphy and

K.O. Onadipe, and The Voice by G. Okara.

- The therapist showed the subjects how to flip through the first book and she pointed out the different sections to survey, e.g.,
 - The title of the book
 - The author of the book
 - The Publisher
 - Date & place of publication
 - The content page
 - Number of pages
 - Number of chapters/sub-headings under chapters.
 - Structure/Arrangement of the book
 - Questions/Question position
 - Conclusion
 - References
 - etc.
- The therapist also led the subjects to survey the second book and note the different sections.
- The therapist then gave out copies of the passage to be surveyed: "Louis Pasteur"
chapter 6, Pp. 37-39 of Secret Formula by McCallum;

Louis Pasteur

Jack Martin went to his room immediately after the meeting with Mr. Tyne and went to bed. He wanted to be up early the following morning to begin studying. So the next day he went to the library and picked up a biography of Louis Pasteur, the one that the librarian had recommended to him. Luckily, Perry Simpson, who shared his room and who was almost always there, had gone out for the day and would not be there to disturb him. More important, Perry would not see Jack take the spoonful of Mr. Tyne's secret formula. If caught, Jack had thought he might say it was cough syrup, but as he did not have a cough and as Perry was a very suspicious fellow, he feared that he would not be believed.

Jack carefully poured a spoonful of the brown liquid and swallowed it. Then he turned to the first page of the biography and began to read.

That night he read the handwritten pages which were the notes he had taken that day. They read as follows:

Louis Pasteur, who made some of the most valuable discoveries in the history of science, was a French chemist. He was born on Dec. 27th, 1822 at Dole, Jura in France. Shortly after his birth his family moved to Arbois, which was where Louis attended elementary and

secondary school. Later he went to the Royal College of Besancon where, in 1840, he obtained his degree, although he had the words "mediocre in chemistry" written on his diploma.

As a student Pasteur made an observation that was to be a guide for him the rest of his life; "There are three things - will, work, and success - which fill human existence." Later, as a Professor, he was constantly telling his students, "You have to work."

In 1843 Pasteur entered the Ecole Normale and attended the lectures of Jean Baptiste Andres Dumas, who inspired him to study chemistry. Four years later, in 1847, he received his doctor's degree.

During the next few years he taught physics in various universities but it was in Lille, where he was dean of the new Faculty of Science, that he was able to apply his special interest, which was fermentation, to the manufacture of alcohol from grain and beet sugar. In 1857, as director of scientific studies at the Ecole Normale, he made the important statement that fermentation is the result of tiny organisms found in the air.

During the 1860s Pasteur was proclaimed the leading chemist of his day and received many great honours from

France and from other countries. From his experiments with fermentation came pasteurization, which was the process of the sterilization of food by controlled heat.

In June, 1865, Pasteur, as an official representative of the government, went to the south of France to investigate a disease which was attacking silk worms and ruining the entire silk industry. After performing many experiments he was able to find the cause of the disease and prevent its spread, thus saving the industry.

He continued to teach physics and chemistry in different universities and at the same time to experiment with fermentation. In many instances he worked alone. He did have one faithful assistant, however - his wife Maire, whom he had married in Lille while teaching there. Marie was a woman who devoted her life to her family and, with her husband in his experiments.

Men from all over the world came to Pasteur for assistance. In 1877 he was asked to do something about anthrax, a disease that was killing the cattle and sheep of France. In 1880 he worked on chicken cholera; an epidemic was destroying ten per cent of the chickens of France. He soon

discovered the cause and cure of the cholera and then returned to anthrax and applied to it some of the methods he had used in the chicken disease. He produced a successful inoculation material which brought on a mild attack on anthrax, making an animal immune against a stronger attack. Pasteur called this method vaccination.

One of the most important of Pasteur's discoveries was the preventive treatment of rabies. He experimented with an inoculation material taken from dogs with rabies. In 1885 he successfully tried it on a nine year-old boy, Joseph Meisler, who had been bitten by a rabid dog.

In 1888 the Pasteur Institute was opened in Paris and Pasteur was made director. This institute, which was constructed by international public funds, was dedicated to the investigation and prevention of rabies.

Pasteur died near St. Clud on September 28th, 1895. He was one of the greatest scientists in history. All his life he remained a man of modest means and set an example of simplicity in living.

It was now twenty past ten. Jack was tired but he had found that the time had gone very rapidly and, instead of being bored, he had thoroughly enjoyed reading the

biography of Louis Pasteur. The librarian had been right, it was indeed a good book. Or, he wondered, had he enjoyed it because of "Frankenstein's" secret formula?.

- The therapist led the subjects to survey the passage.
- Verbal Reinforcement: Whenever subjects made correct points the therapist issued encouraging remarks like: "Very Good," "Excellent," "Well done," "Nice point" etc.

Step II: Question:-

- The therapist led the subjects to turn the points surveyed in the books and the passage into questions e.g.,
 - What is the title of the book?
 - Who is the author?
 - When and where was it published?
 - Who was the publisher
 - How many pages has the book?
 - How many chapters has the book?
 - How is the book arranged?
 - Are there questions at the beginning, middle or

the end of each chapter?

- The therapist also led the subjects to do the same thing with the passage. She gave them SQ3R Worksheet I (See Appendix Ci) to assist them in surveying and raising questions.
- Self Reinforcement: The therapist encouraged the subjects to make the following positive statements aloud so as to boost the morale:
 "I need to improve in my academic work and pass my examinations.
 I have been introduced to the SQ3R study formula.
 I shall not give up until I master it thoroughly.

Session II: Biology

SQ3R Steps I & II: Survey & Question (Biology).

The therapist informed the subjects that she would be actively involved in teaching them some Biology topics, on which they would base the use of the new study formula.

- The therapist undertook an active teaching of Biology Study Content I: Digestion (1) using chart I (See Diagram I) to make necessary explanations.

Study Content IDIGESTION (I)

Digestion is the process by which large molecules of food are broken down into simple absorbable form. Digestion and absorption take place in the alimentary canal (See Diagram I and Chart I). Digestion is brought about by means of chemical compounds called enzymes.

Absorption is the process through which the broken-down food enters the blood vessels. As the food passes through the alimentary canal it is broken in stages until the digestible material is dissolved and absorbed.

Movement of Food Through the Alimentary Canal

Ingestion: the process of taking in of food.

Digestion: the process of breaking the food down into simple, soluble form which the body can use.

Egestion: the expulsion through the anus of undigested remains of food.

1. Digestion in the Mouth:

In the mouth, the starch in the food is mixed with saliva which is secreted by the salivary gland and the process of breaking the starch down into simpler molecules is

started. The changes from starch to glucose is brought about by the enzymes in the saliva.

2. The Gullet or Oesophagus:

From the mouth the food passes into the gullet which is a narrow tube which connects the mouth to the stomach. While the muscles above the food contract, those below it relax. Thus, the food is pushed down towards the stomach.

3. The Stomach:

The stomach is a large pear-shaped, sac-like organ. It is made up of connective tissues which hold the organ together. There are also muscle tissues that contract and relax. The food which has been softened and mixed with saliva in the mouth passes down the gullet into the stomach where the gastric juice, acidic in nature, acts on it. The stomach retains the food for three to four hours, and as a result of muscular contractions, it churns the food and reduces it to a thick creamy acidic fluid referred to as Chyme.

4. Digestion in the Duodenum:

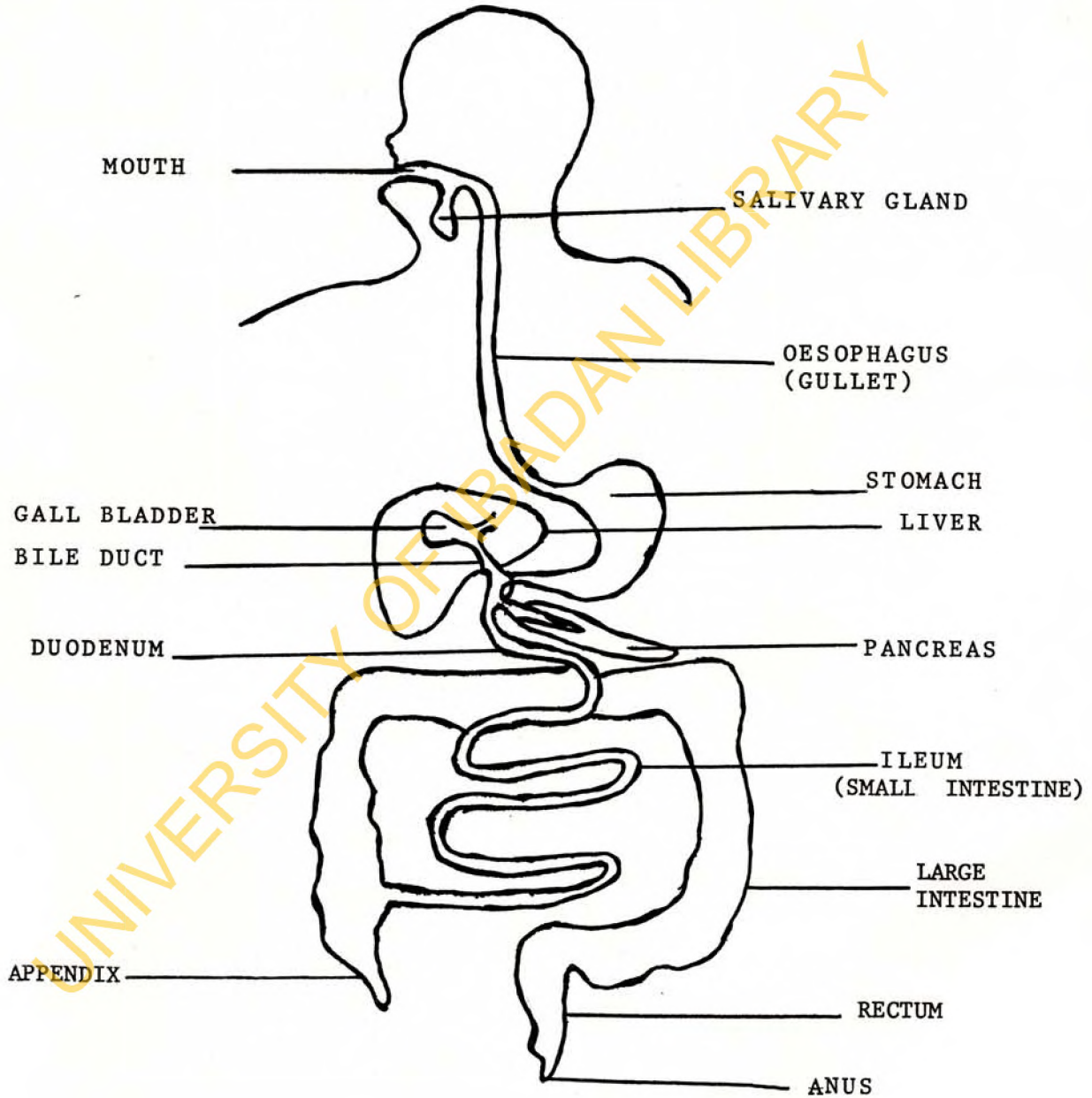
The digestive juice from the pancreas and the bile from the liver are poured into the duodenum. The pancreas is

a cream-coloured gland lying below the stomach. Its cells make enzymes, and three of these enzymes act on carbohydrates, protein, and fats. Carbohydrate or Starch is broken down to glucose, protein is broken down into peptides and amino acids, while fats are split up into fatty acid and glycerol.

The bile is a green, watery fluid made in the liver, stored in the gall bladder and conducted to the duodenum by the bile duct. The bile helps to break up fat into tiny droplets.

UNIVERSITY OF IBADAN LIBRARY

DIAGRAM I
DIGESTION IN MAN



- The therapist then handed over to each subject a copy of study content 1 as home assignment for the subjects to apply the first two steps of SQ3R: Survey and Question, in preparation for studying the content. The subjects were told to get a notebook each where they would do assignments given on SQ3R.

Week 5

Session I: English Comprehension

- The therapist opened Week 5 with a discussion about the assignment given in Biology and their application of the first two steps of SQ3R. She asked if they had any difficulty and she ensured that the two steps were correctly applied.
- The therapist explained to the subjects that the next step in the SQ3R technique is "Read" and they should really be prepared to read carefully and deeply because real concentrated reading was involved. The therapist then explained reading in behavioural terms:
 - (a) Always set aside a particular place and time for study-reading.

- (b) Avoid procrastination.
 - (c) Ensure that the reading environment is suitable: airy, quiet, well-lit etc.
 - (d) Keep all materials needed for the reading by you e.g. dictionary, the Reading Book, your jotter, a map, the four-figure table, the Mathematical set (if science is studied). Then keep away other irrelevant materials that may distract your attention.
 - (e) Keep a completely free mind.
 - (f) Avoid other sources of distraction.
 - (g) Read with full concentration.
 - (h) As you read on, have a pencil nearby to underline strategic words and any relevant references.
- The therapist gave out to the subjects copies of the passage to be read: "Louis Pasteur" (See Session 4a).
 - Modelling: With a pencil in hand and her table cleared of irrelevant materials, the therapist modelled/ demonstrated how to read deeply with full concentration and she got the subjects to watch.
 - Rehearsal: The therapist then got the subjects to rehearse how to read, they cleared their tables leaving only the materials needed for the work at hand. They

sit right with their pencils in hand, ensuring that the classroom environment is free from distraction or disturbance. The therapist went round to give assistance where necessary. She told the subjects to quickly repeat the first two steps: Survey & Question before commencing the reading.

- Verbal Reinforcement: Each time the subjects performed the right actions, the therapist issued encouraging remarks: "Quite good", "Excellent", "Fine", "Well done", "That's right".

Session II: SQ3R Step III: Read (Biology)

- The therapist again undertook an active teaching of Biology Study Content II. (Digestion II) explaining thoroughly Diagram II, Chart II: "Cross Section of the Small Intestine":

Study Content 2

DIGESTION (II)

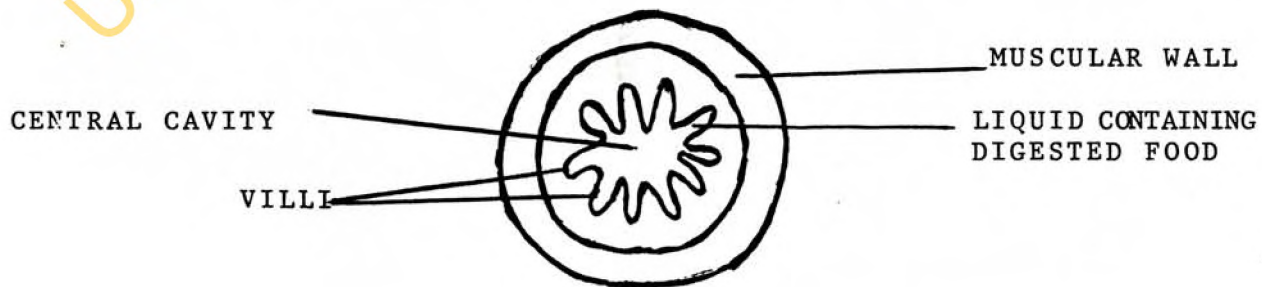
Before the therapist taught more facts about digestion, she revised the main stages of digestion learnt during the last lesson: digestion in the mouth, the oesophagus (gullet), the stomach, and the duodenum.

The processes of digestion continue as the food, already broken down passes into the:

5. Small Intestine or the Ileum:

The small intestine is a long narrow tube measuring about 2.5 centrimetres in diameter and 6 metres long. The digestion is continued and completed here by the intestinal juice produced by the small intestine. By now the starchy substances (carbohydrate), the fats, and the proteins in the food have been broken down into smaller molecules of glucose, fatty acids, and amino acids respectively. The body can readily use those substances because they can pass through the walls of the small intestine directly into the blood stream. This happens through the structure called VILLI in the walls of the small intestine (See Diagram II and Chart II). The Villi are fingerlike structures at the intestinal wall which provide a large surface area for the food to be absorbed into the body through the hepatic portal vein.

DIAGRAM II
CROSS SECTION OF THE SMALL INTESTINE



6. The Large Intestine:

The large intestine is about twice the diameter, but less than one-third the length, of the small intestine. The part of the food reaching the large intestine is waste material which is useless to the body. As this waste material passes on, the large intestine absorbs any extra water it contains. The waste material thus becomes hard; and it is passed out from the body through the anus.

Storage of Food in the Body

Carbohydrate or starch digested into simple sugar in the alimentary canal is absorbed through the small intestine into the blood. Some of the absorbed sugar combines with oxygen to produce water, carbon dioxide and energy. Some of the unused sugar is however, converted to glycogen and stored in the liver and the muscles until when needed by the body.

Some excess carbohydrate is changed by a complicated process into fat. Excess fat is deposited in the fat depots of the body, for example around the thighs abdomen and the buttocks.

Excess protein is usually not stored in the body; it is changed into urea and excreted.

- The therapist handed to the subjects a copy each of Study Content II and she told them to study it from home, applying the first three steps of the SQ3R technique which they had learnt.

Week 6

Session I:

SQ3R Steps VI & V: Recite and Review (English Comprehension).

- The therapist asked the subjects their experience at home as they tried to apply the first three steps of the SQ3R technique. Subjects were encouraged to discuss freely any difficulty they encountered to ensure correct application of the steps. They were also reminded that the diagrams too should be read and studied carefully.
- Subjects were then told to bring out copies of the reading passage ("Louis Pasteur"). Subjects were led to read through the passage again.
- The therapist then told the subjects that the next step "Recite" which is Step IV involved keeping aside the passage and jotting down the important points read. She told the subjects that this step provided

a test of the understanding of what was read, and she also hinted them that here the tendency to want to recite orally/mentally was great but that it would pay better to jot down the points so as to use it for revision toward examination period.

- The therapist then gave out the SQ3R Worksheet II (See Appendix Cii) and she trained the subjects how to use it to recite point by point using the underlined words or phrases.
- Token Reinforcement: The therapist went round to assist the subjects as they listed down the important points read, and she put a tick beside each point correctly recited.

Step V: Review:

- The therapist then trained the subjects how to review by bringing out the passage again and looking through to see how well they have recited and the points left out or not well understood.
- The therapist went round to help subjects as they added some points and corrected their jotting.

- Verbal Reinforcement: The therapist gave encouraging remarks whenever the subjects performed well.
- Self Reinforcement: The therapist got the subjects to make the following positive statements:
"Now, I have been introduced to the SQ3R study technique.
I shall master it thoroughly and apply it to all my assignments!"

Session II:

SQ3R Steps IV & V: Recite and Review (Biology)

- The therapist engaged in an active teaching of Biology Study Content 3 "Reproduction," giving a thorough explanation and using diagrams IIIa & IIIb and charts III & IIIb.

Study Content 3

Reproduction

What is Reproduction?

Reproduction refers to the process of bringing forth off-spring into existence thereby bringing about a natural increase.

Types of Reproduction:

Sexual Reproduction: This involves the fusion of male and female sex cells to form a zygote that will later develop into an off-spring. It takes place during mating or copulation between male and female.

Asexual Reproduction:

This happens when an organism can produce two or more organisms of its own kind without involving any other organism e.g., amoeba, a unicellular organism found in water, can divide into two by asexual method of reproduction.

Reproduction in Human Beings

The Female Reproductive Organ:

(The therapist uses Diagram III(a) and Chart III(b) to explain the organ to the subjects).

The eggs are produced in the ovaries, of which there are two. Every month one of the ovaries releases one egg (occasionally two) which passes along the oviduct to the uterus, or womb. The egg is tiny, and the journey takes about five days. During this time the inside wall of the uterus becomes thickened, with an extra supply of blood vessels. If the egg happens to be fertilized by a male sperm, it sticks to the wall of the uterus and begins to

grow. If it is not fertilized the egg dies. The extra blood supply to the uterus wall is not needed, and the cells break away, together with some blood, which leaves the body through the vagina. The bleeding which thus occurs is called menstruation, and it usually takes place every twenty-eightth day (roughly every month) and it lasts for about five days.

The Male Reproductive Organ:

The male sex cells are called sperms and are produced in the pair of testes and epididymis surrounding them. (See diagram III(b) & Chart III(b). They pass through a long narrow tube, the sperm duct, where they are stored. During mating or copulation the penis fills with blood, supplied by the spermatic cord, which makes it larger and stiff. This makes it possible for it to be inserted into the vagina. Its movement in the vagina causes the sperm fluid to pass through the penis into the vagina.

Before the sperms pass into the vagina, however, they mix with the secretion of Prostate and Cowpea's glands which makes it possible for the sperms to swim very well. Each sperm has a head and a tail which enable it to swim into the uterus, and on into the oviducts. If they meet with an egg they gather round it and one sperm may enter an egg and fertilize it.

DIAGRAM IIIA
THE FEMALE REPRODUCTIVE ORGAN

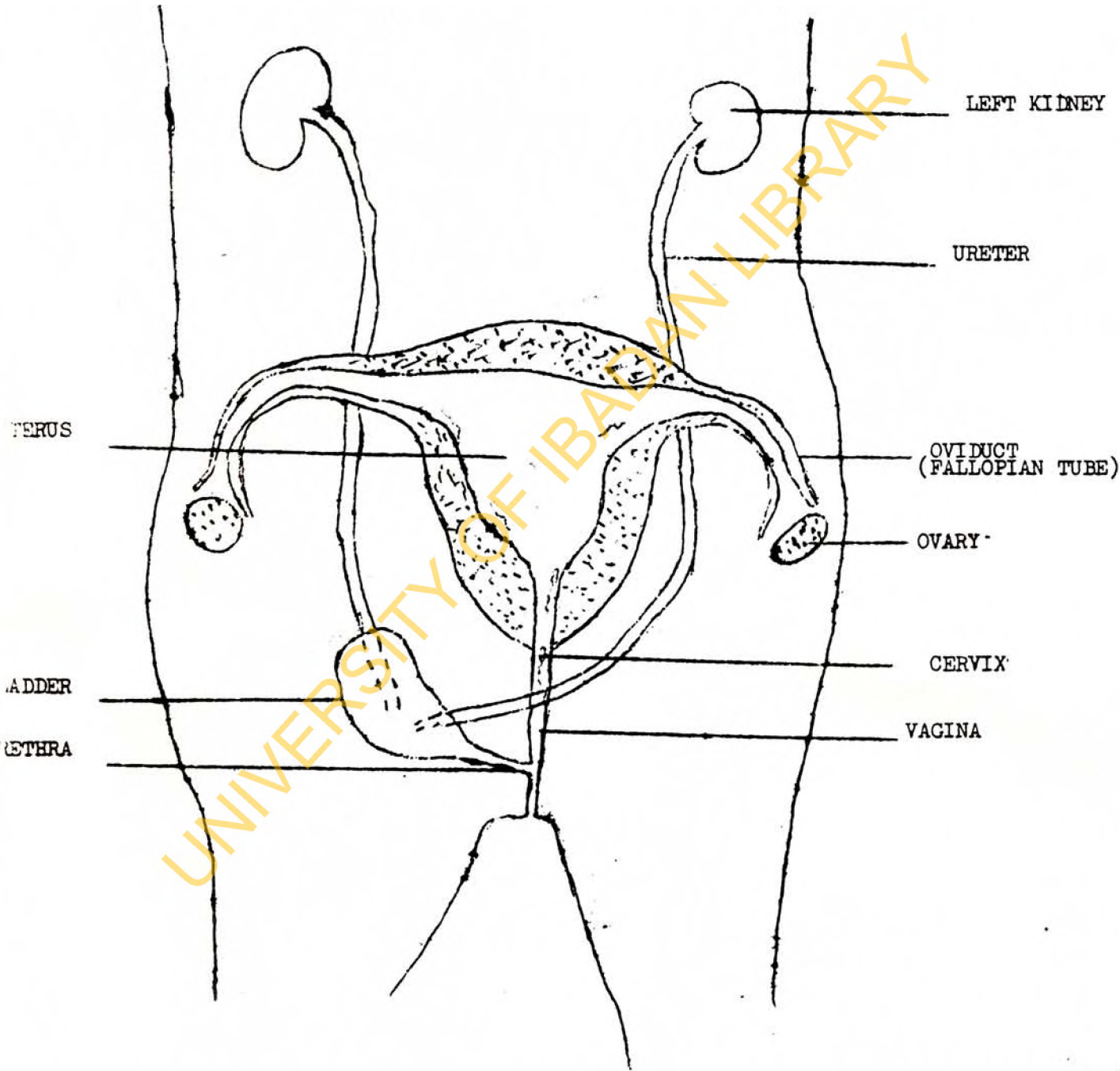
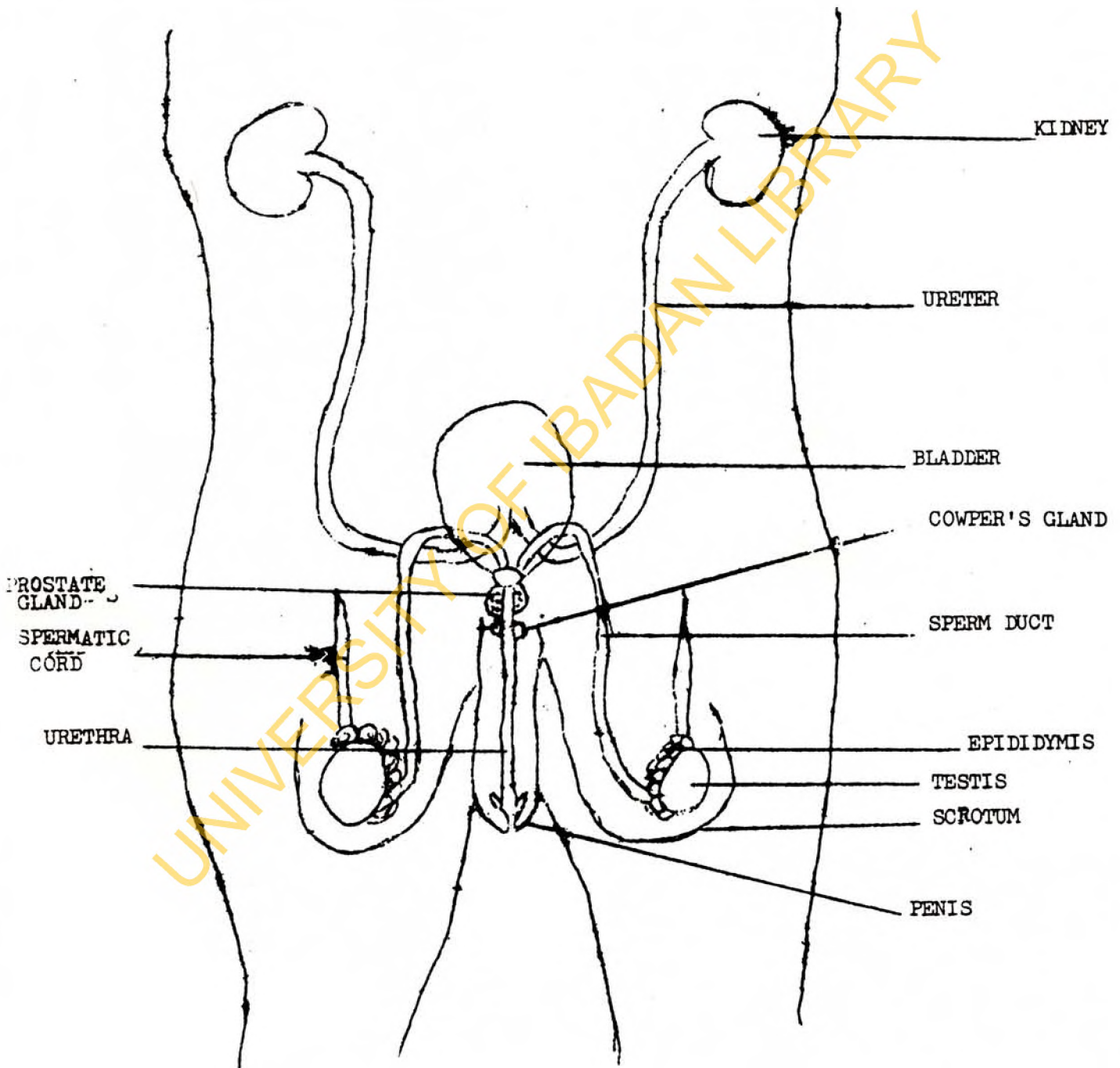


DIAGRAM IIIB
THE MALE REPRODUCTIVE ORGAN



- (ii) Subjects were encouraged to participate fully and ask questions on any point not understood.
- Copies of Biology Study Content 3 were distributed to the subjects to study from home, applying the SQ3R technique. Subjects were encouraged to reproduce and review the diagrams, too.
 - Self Reinforcement: Subjects were encouraged to make the following positive statements:
 "Now I have mastered the SQ3R technique.
 I shall always apply it to all my assignments."
 - Subjects' SQ3R note-book were collected and marked during the week in readiness to give the subject some feedback for the next SQ3R session.

THE (SQ3R) PRACTICE SESSIONS
(WEEKS 7 TO 9: 1 to 1½ HOURS FOR EACH SESSION)

WEEK 7

Session I: English Comprehension

- The therapist opened session 7 with a revision of the five steps of SQ3R: Survey, Question, Read, Recite, Review.
- The therapist distributed to the subjects,
Practice Passage I:

Eze Learns a Lesson

This passage is taken from Eze Goes to School by Onuora Nzekwu and Michael Crowder. It is the story of a village boy and his determination to get an education at a time when it was not so easy as it is today. He had many difficulties to overcome. Many of them were caused by other people but in the following passage Eze has to face a different kind of problem.

In Obodo Central School young Eze came first in the class in all subjects except Mathematics. His closest rival was Chinwe. On the sports field Eze did well, though he could never compete in skill at football with Dede and Belu, his class-mates from Ama. Belu himself was so good that he had become captain of the school's junior team.

There was only one thing wrong with Eze. That was his conceit. His mother had noticed it when he bullied the boys in Ohia village. Mr. Okafor had managed to cure him of it at the time, but now that he was doing so well in school, he began to talk down to many of his class-mates, especially the town boys like Onu and Nwafor, who came regularly at the bottom of the class. Eze never tired of

showing off his own cleverness at their expense, and on more than one occasion referred to them openly as thick-heads. He began to be disliked in the class, and even Belu and Dede found his conceit unbearable. If it had not been for the approaching examinations for Standard VI, the class would undoubtedly have done something about Eze's pride. But the examinations were upon them before they could do anything about it.

The old saying that pride goes before a fall was never truer than in Eze's case. He went in for the examinations with complete confidence that he would come first, not only out of all the people in the class, but out of all boys taking the examination in Obodo District, which had four schools. In fact he did not even bother to study very hard before the examination.

That same month the result of the examination was published. Heading the list from all the four schools was the name CHINWE. Eze looked at it in horror and had to go down as far as fifth place before he found his own name. He thought of his father's warning: 'My son, you must never never let the girl, Chinwe, beat you in school.'

When Eze reached Ohia his mother flung her arms around him embracing him closely, and congratulating him on his

success, for, as always happens in Africa, news travels fast; and the whole village had heard that Eze had gained fifth place out of all the boys in Obodo. Everyone came to congratulate him as the first fruit of their scholarship scheme. Chickens and a special soup were prepared for dinner that night. But Eze did not eat much. His mother could not discover why, in the midst of his success he looked so unhappy. But she did notice he was a little humbler, a little more respectful than she could remember him being for a long time.

- The subjects were led to apply the SQ3R technique step by step, carrying the whole class along, at the same pace and ensuring that each step was correctly applied.
- Token & Verbal Reinforcement: The therapist went round to put a tick beside each point correctly recited in their SQ3R notebook and to reward each subject's effort by making encouraging remarks.
- Self Reinforcement: Subjects were encouraged to make positive self-statements.

Session II: SQ3R Practice: Biology

- Feedback: The therapist gave back to the subjects their SQ3R notebooks so that knowing their performance will reinforce further interest.

- A general discussion about the subjects' assignment and performance was undertaken. Subjects were reminded that diagrams should also be studied, and they should attempt reproducing the diagrams under Step IV, "Recite".
- Active Teaching: The therapist taught the subjects Biology - Study Content 4 using Charts IVa & IVb on which the application of SQ3R will be based.

Study Content 4

Fertilization/Sex Determination

Fertilization:

Fertilization is the fusion of male and female gamete during copulation or mating; it takes place in the female oviduct. (See Diagram & Chart IVa). Millions of sperms are produced but only one fertilizes the egg. Each parent, therefore, contributes an equal share, in the form of sex cells to the formation of a new baby. After fertilization the egg moves into the uterus and attaches itself to the uterus wall. The egg then divides to form the embryo which starts developing to form the baby. The embryo develops a rootlike growth called placenta which is closely

joined to the uterus wall. Through the placenta the embryo obtains all it needs to grow into the full-sized baby. Note that the mother and the baby have separate blood systems.

It takes about nine months for the embryo to grow to the size it will be when it is born. The time it takes the child to grow in the womb between fertilization and birth is called the GESTATION PERIOD. During this time the mother is said to be pregnant.

When the baby is ready to be born, the muscles of the uterus contract pushing the baby out through the vagina. Immediately the baby is born it starts to breathe, using its lungs, and it soon starts to suck milk from its mother. (See Diagram IVa for Reproduction Cycle).

Sex Determination:

A woman's sex cells consist of a pair of X chromosomes (xx). (Use Diagram IVB on Chart IVB to explain this) and those of a man releases X and Y chromosomes and the woman releases her own XX chromosomes. If the female egg is fertilized by the X Chromosome of the man, a baby girl will be born. If, on the other hand, the female egg is fertilized by the Y chromosomes of the man, a baby boy will be born.

The male is therefore the determining factor of whether a boy or a girl will be born.

(Discuss the relevance or the day-to-day application of this fact about sex determination with the subject): some men accuse and victimize their wives for bringing forth female children all the time as if the woman alone carries the blame. Such people should be enlightened about how a baby's sex is determined.

(For Diagrams IV(a) & IV(b) see pages 296 and 297.

- A copy of study content 4 was then given to each subject to study from home applying the SQ3R technique.

Week 8

Session I:

SQ3R Practice (English Comprehension)

- The therapist gave subjects Practice Passage II, "The Great Elephant Bird."

The Great Elephant-bird

(This is the title of the first story in a collection of twenty tales by the famous Nigerian author, Cyprian Ekwensi. If you like reading traditional stories, handed down from one generation to another for hundreds of years,

DIAGRAM 5A
FERTILIZATION AND THE DEVELOPMENT OF THE FOETUS IN MAMMALS

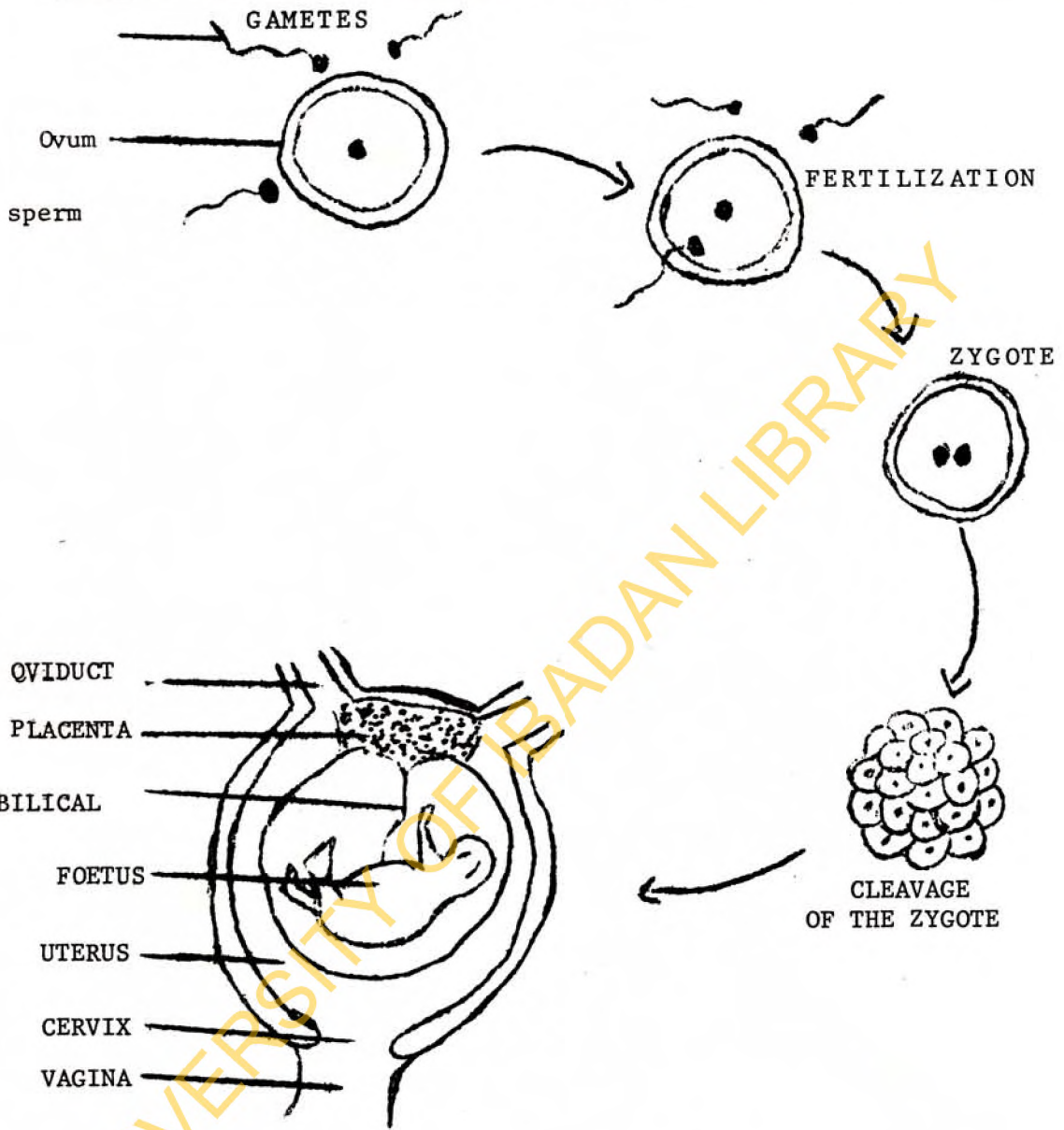
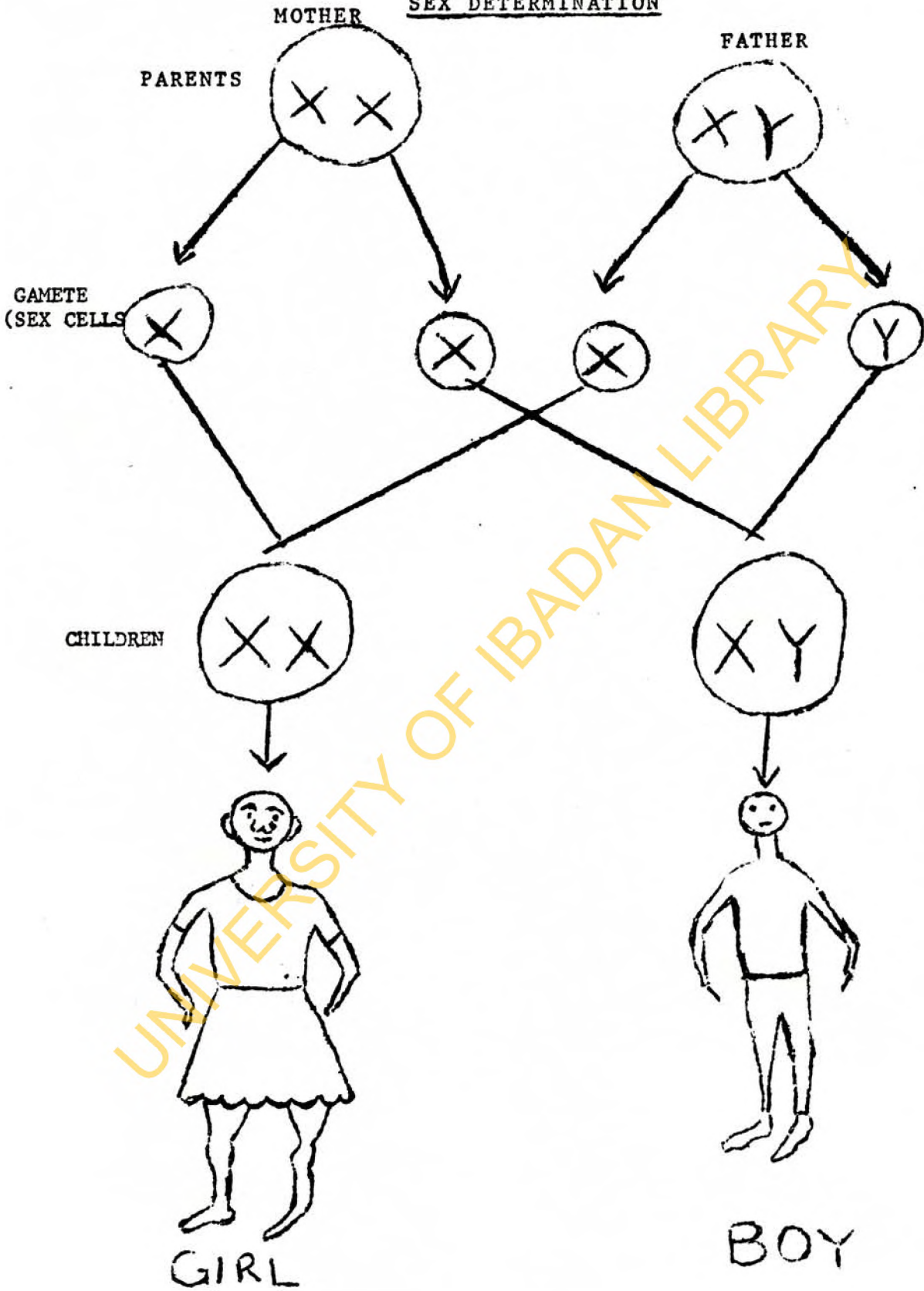


DIAGRAM 5B
SEX DETERMINATION



then this is the book to read. But as you read them, remember what the author tells us in the introductory note: 'If the reader wants to capture the traditional atmosphere of these tales, he must remember that they used to be told only at night', for it was believed that the narrator's mother would die if they were told by day).

The envy of his fellow-men forced a certain man to move into the forest to live with his wife and seven children. It was such a lonely spot that the woman had to set off at dawn for market and never got back before dark.

Whenever she left a great Elephant-bird used to come and look round the settlement, watching the children with hungry eyes. The man had seen this Elephant-bird kill all sorts of animals, and he was not happy about these visits. He warned his wife to be careful where she walked. There was no knowing what the great bird was capable of doing.

One market-day the man said to his wife:

'You'll have to feed the children now. You're going to market and may not return till late, and I have to go into the bush. I want to get some poisoned arrows made to destroy this Elephant-bird. I am getting really afraid of him.'

As soon as the woman had paddled her canoe across the river and the man had disappeared into the forest, the

great bird emerged.

'My son, where is your mother?'"
 'She's gone to Amagu market.'
 'And where is your father?'"
 'He's gone to get some arrows made.'
 'What will he do with the arrows?'"
 'He wants to kill the great Elephant-bird.'
 'Does he?'

The Elephant-bird looked down at the little boy, and with one peck swallowed him.

Every market-day the father went to meet the man who was making the arrows and the mother went to market. The bird never failed to come, and on each occasion it swallowed another of the seven children.

On the seventh market-day the father returned to find the bird threatening the last of his sons.

'He's gone to get arrows, has he?'"
 'Yes.'
 'What does he hope to do with them?'"
 'He hopes to kill the great Elephant-bird.'
 'I see.'

It was in the act of swallowing the boy when an arrow twanged through the air. The bird, pierced through the throat, fell shrieking to the ground and died. The father rushed towards it, cut it open and removed his sons. From the bush he got a certain herb, and squeezed its juice into the eyes of his dead sons.

Five of them sprang to their feet, but the last one was too far gone. From that day onwards the man and his family lived in peace.

- Subjects were allowed to go on at their own pace in the

application of the SQ3R steps. The therapist, however, went round to give assistance where necessary and to apply Verbal and Token Reinforcements as in previous sessions.

- The therapist asked the subjects how many of them were already applying the SQ3R technique to all their studies generally. Subjects were then given some hints to follow to be able to use the technique in natural context:
 - (a) Avoid procrastination: tackle your study assignments immediately they are given, to avoid accumulation and consequent rushing, as the application of the technique takes some time.
 - (b) Keep a free mind so as to be able to concentrate on the correct application of each step.
 - (c) Avoid distraction so as to spend your time at study wisely otherwise the application of the technique may look unnecessarily cumbersome.
 - (d) If possible, cultivate time and place habits for study, and any time you are disturbed, look for a more suitable place of study.
 - (e) Always apply self-reinforcement to boost your own ego and feel better disposed to apply the technique always.

Session II:SQ3R Practice: Biology.

- Feedback: Subjects' SQ3R notebooks were distributed so that they could see how they performed in the last assignment.
- The therapist went over the assignment, noted subjects' performance and helped them when they encountered any difficulty in the application of the technique. The therapist reminded the subjects not to leave out the diagrams but to reproduce them or label already drawn diagrams when they got to Step IV, "Recite." The therapist encouraged the subjects to ask questions and discuss any difficulty they had with the therapist.
- The therapist then engaged in an Active Directive Teaching of Biology Study Content V:

Study Content 5(a) Secondary Sex Changes / Family Tree

At a stage during the individual's growth some changes occur in the body to indicate that the individual is sexually mature and that he/she has reached puberty. These changes are controlled by sex hormones which are produced at sexual maturity. Hormones are chemical substances which

help to co-ordinate the functions of the body. Sex hormones stimulate the growth of the sexual organs at the time of puberty.

Puberty occurs two or more years earlier in girls than in boys; it occurs in girls between 11/12-14 years and in boys between 13-15 years.

Female Secondary Sexual Characteristics

The first signs of sexual maturation in girls are:

- (i) the enlargement of the breasts.
- (ii) the enlargement of the pelvis
- (iii) the appearance of hair on the pubic regions and the arm-pits.

Then follows the first menstruation.

Male Secondary Sexual Characteristics

The first signs of sexual maturation in boys are:

- (i) Pubic hair and hair in the arm-pits.
- (ii) the growth of facial hair i.e. the beard and the moustache.
- (iii) the breaking and the deepening of the voice.

Then occurs increase in the size of the reproductive organs including the penis.

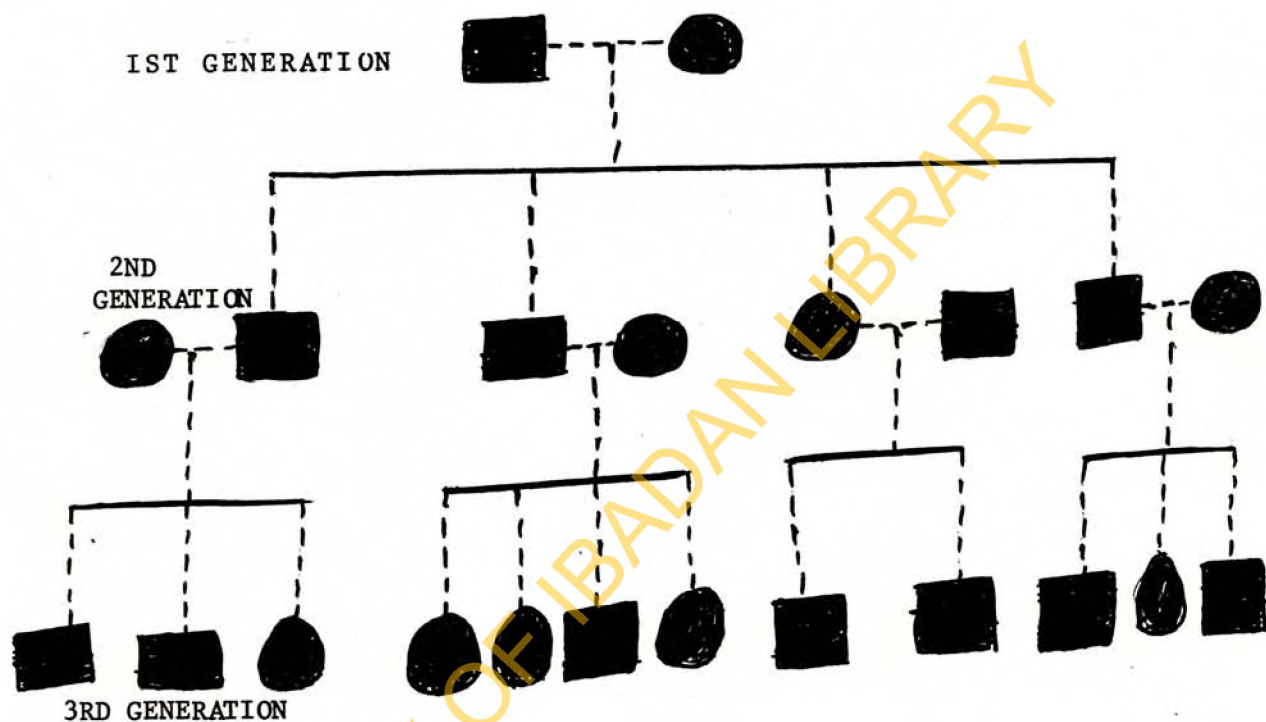
(b) FAMILY TREE

Man reproduces and brings forth up-spring from generation to generation. This ensures the continuity of the family. The traits or characteristics feature transmitted and how they develop in an individual can be studied by making observations of similarities existing among members of a family. A method of doing this is by preparing a family tree.

A family tree refers to lines of generation of parents and offspring and it traces the descendants of a man and his wife/wives. Note that where the man has more than one wife, each wife will make up one unit. (See Diagram V on page 304).

- Subjects were given a copy of study content V to study from home applying the SQ3R technique.
- The therapist collected subjects' SQ3R notebooks during the week for grading.

DIAGRAM V

A FAMILY TREE SHOWING THREE GENERATIONS

First generation is represented by a man & his wife.

Second generation: their children—three sons and a daughter.

Third generation: their grandchildren.

KEY	
	Female
	Male
	Descendants
	Marriage lines
	Lines of generation

Culled from P. 14,
STAN Nigerian Integrated
 Science Project Pupils'
Textbook III. Heinemann
 Educ. Books (Nig.) Ltd. 1985.

Week 9Session I:SQ3R Practice (English Comprehension)

- (i) Ther therapist gave out to the subjects Practice Passage III: "The Wrestlers":

The Wrestlers

The drummers took up their sticks again and the air shivered and grew tense like a tightened bow.

The two teams were facing each other across the clear space. A young man from one team danced across the the centre to the other side and pointed at whomever he wanted to fight. They danced back to the centre together and then closed in.

There were twelve men on each side and the challenge went from one side to the other. Two judges walked around the wrestlers and when they thought they were equally matched, stopped them. Five matches ended in this way. But the really exciting moments were when a man was thrown. The huge voice of the crowd then rose to the sky and in every direction. It was even heard in the surrounding villages.

The last match was between the leaders of the teams. They were among the best wrestlers in all the nine villages. The crowd wondered who would throw the other this year. Some said Okafo was the better man; others said he was not the equal of Ikezue. Last year neither of them had thrown the other even though the judges had allowed the

contest to go on longer than was the custom. They had the same style and one saw the other's plans beforehand. It might happen again this year.

Dusk was already approaching when their contest began. The drums went mad and the crowds also. They surged forward as the two young men danced into the circle. The palm fronds were helpless in keeping them back.

Ikezue held out his right hand. Okafo seized it, and they closed in. It was a fierce contest. Ikezue tried to dig in his right heel behind Okafo so as to throw him backwards in the clever ege style. But the one knew what the other was thinking. The crowd had surrounded and swallowed up the drummers, whose frantic rhythm was no longer only a sound but the very heart-beat of the people.

The wrestlers were now almost motionless in each other's grip. The muscles on their thighs and on their backs stood out. It looked like an equal match. The two judges were already moving forward to separate them when Ikezue, now desperate, went down quickly on one knee in an attempt to fling his man backwards over his head. It was a sad miscalculation. Quick as lightning Okafo raised his right leg and swung it over his rival's head. The crowd burst

into a thunderous roar. Okafo was swept off his feet by his supporters and carried home shoulder-high.

They sang his praise and the young women clapped their hands.

'Who will wrestle for our village?
Okafo will wrestle for our village.
Has he thrown a hundred men?
He has thrown four hundred men.
Has he thrown a hundred Cats?
He has thrown four hundred Cats.
Then send him word to fight for us.

- The therapist repeated the first three steps of session I under week 8.
- The therapist reminded the subjects to use the SQ3R technique in all their study assignment. While the therapist moved round the class to help subjects where necessary, there was also great emphasis on subjects' self-monitoring and self-management of the technique application.
- Self Reinforcement: Subjects were asked to make the following positive statements:
"Now, I have mastered the SQ3R study formula, I shall always apply it to all my studies."

Session II:SQ3R Practice: Biology

- The therapist repeated the first three steps of session II under Week 8.
- The therapist then taught the subjects study content 6: "Health and its Maintenance":

Study Content 6Health and its Maintenance

Health is the state of total well-being of an individual, it is not merely the absence of disease or infirmity.

Levels of Health:

The health of an individual varies from time to time within three levels. There are:

1. Optimal level: The highest level of health where an individual is able to function beyond his normal capacity without any trouble.
2. Average level: This is the level when an individual is not able to function beyond his normal capacity.
3. Low level: This is a stage at which an individual functions below his normal ability e.g. when one is tired or during illness.

Ways of Maintaining Good Health

A person is healthy and lives a full life when he eats good food, and also does the following:

- (i) Wears clean clothes
- (ii) Maintains personal cleanliness.
- (iii) Lives in a clean environment
- (iv) Avoids bad habit such as smoking cigarettes or drinking alcohol.
- (v) Stays away from drug abuse.
- (vi) Takes adequate rest.

Good hygiene involves taking care of the body and this includes the following:

- (a) Food: A person must take food everyday in order to enjoy good health. The food should contain carbohydrates, protein, fats, vitamins and mineral salts in reasonable proportion. These food items must be in sufficient quality and quantity. Also, there must be enough water taken daily. The meals must be enough water taken daily. The meals must be taken at regular times, at least thrice daily because regular meals will make the digestive system work efficiently.

- (b) Exercise: It is necessary to take some physical exercises at appropriate times. Games and sports such as football, basket-ball, netball, running and jumping etc are necessary to keep the body fit. Violent or over-active exercises should be avoided since they way be dangerous.

Effects of Exercises on Health:

When exercises are taken regularly, adequately and in fresh air, their value and benefit are considerable:

1. The appetite is increased and easy digestion and free movement of the bowel occurs.
2. Mental work is done with greater ease because a sound body contains a sound mind.
3. Good muscle tone is developed.
4. The lungs are expanded, thus increasing the rate of respiration.
5. Excretory organs work better as the skin sweats more freely.
6. The heart pumps more blood round the body to all tissues.

The Common Ill-health

Most of the diseases which make man ill are due to a particular organism which harbours itself in the body of

man, working places and play-grounds. They may enter the body through the mouth when man eats, through the nostrils when he breathes, and it may become parasitic on the skin.

The major causative agents of diseases causing ill-health are bacteria, viruses, fungi and worms. The sources of infection may be by contact, infected air droplets, contaminated food or water, and insect vectors. Some diseases causing ill-health measles, small pox, influenza, mumps, whooping cough, and tuberculosis.

Prevention of Diseases Causing Ill-health

1. Avoid over-crowding especially in living, working and sleeping rooms.
2. Rooms must be well ventilated so as to ensure a good supply of fresh air.
3. There should be good hygiene of the body and environment.
4. All affected persons should be taken to the hospital and treated immediately.
5. Spitting in the public should be avoided.
6. Appropriate immunization and vaccination should be given.

- The therapist encouraged the subjects to study from home the Biology lesson just taught. Subjects were also reminded to study all the other subjects using the SQ3R techniques; they were to report any difficulty encountered to the therapist for assistance. Subjects' notebooks were graded during the week and returned to them for effective feedback of their performance.

Weeks 10 & 11:

Post - Tests

The therapist gave the subjects post-tests in the same way pre-tests were organized (See Weeks 10 & 11 under 'Treatment Package' in Chapter II).

APPENDIX BTHE SUMMARIZATION TREATMENT PROGRAMME (FOR GROUP B)WEEK 3: SESSION 3GENERAL ORIENTATION: 1 - 1½ HOURS1. Awareness and Motivation.

It has been observed that many of you students achieve low in your academic work. It may not be correct to say that this happens because you are lazy. Many of you address yourselves squarely to your books but yet you achieve poorer results than your expected. A major cause of such poor outcome after much input is deficient or inappropriate study habit. One may read for several hours, without applying the correct study technique, little will be achieved. Yet everybody knows the importance of success to a student's life. For example, you would love to be gradually promoted to higher classes so that at the end of your secondary school programme, you can gain admission into higher institutions of learning such as universities, Polytechnics and colleges of Education where you can pursue a life career.

This is the more reason why you have to be helped to maximize achievement and get positive results from any effort you make. One way of doing this is acquire training in the use of effective study techniques which, if well mastered and

applied to your studies, will make learning more interesting to you, and yield good results. One of such techniques is summarization which can be used to handle all your subjects to make them more meaningful and easy for you to learn, understand, remember, and pass very well during examination.

I have no doubt that you would want to learn the technique to benefit from its advantages. All that will be necessary for you to do is to be ready to learn the technique and persist until you master it very well so that you can apply it to all your subjects. As of now, training in the use of Summarization will be given in English Comprehension and the Biology aspect of Integrated Science. After mastering the technique, it will not be difficult for you to transfer the knowledge to other subjects. You will then be proud of having learnt a fruitful and rewarding study technique.

On my own part, I shall be ready to give you all the training required and make everything as interesting as possible.

2. Rationale

The Summarization technique is applied to make study more effective. Going carefully through each of the five steps of the technique ensures good understanding of what

is studied. You will agree with me that understanding is basic to the acquisition of knowledge and in ensuring success in any study assignment.

Moreover, searching for the key points which is a major sub-skill in Summarization will prove very useful for revision during examination because it brings the main points together and makes them easy to remember.

Are you ready to learn the Summarization study technique?

3. Introduction

What is Summarization?

Summarization mainly involves the intensive and thorough reading of a study assignment to the stage that one understands it very well to be able to fish out the key points. Such key points are then used to build up some concise statements which will be representative of the whole content read.

Thus, there are five main steps involved in Summarization:

1. Preview the passage.
2. Read intensively
3. Search for the key points
4. Formulate concise statement.
5. Glance through the passage again.

(The therapist writes the five steps on the chalk-board).

Step: Pre-view the passage:- The first thing to do to any study assignment is to pre-view it; look through to see its main features. You will note its main heading, its sub-headings, the underlined words, words italicized, the number of paragraphs, the length of the assignment etc. This is an essential step you must take before the actual reading commences. If it is a book, you should, in the same way, flip through the book to note the author, the publisher, the year of publication, the number of chapters and their titles.

Stepp II: Reading intensively - You will first undertake an undisturbed and uninterrupted reading of the assignment. This type of reading should be done in a quiet environment where there will be no distraction. You should get so involved in the reading that you enter into the author's world and understand his message. You should be clear about the content of every paragraph in the reading assignment.

Note that you are free to make use of any material that will aid your reading. For example, you can make use of your dictionary if you wish, and you can check up relevant diagrams that will aid comprehension.

Step III: Search for the key points:- You now have to pick out the important points and write them down. Sometimes the key points are contained in the opening sentences of a paragraph. Sometimes they are here and there in the paragraph, and sometimes they are contained in the concluding sentences of the paragraph. Inability to search for the key points is a mark of poor comprehension.

Step IV: Formulate concise statements with the key points

Here, you now use the key points to build up short direct statements which, when put together will be representative of the passage. You need to note certain points:

- (a) Do not use too many words. In fact, the statements need not be written in complete sentences. If, the summary is too long it will involve much waste of time.
- (b) Avoid statements that are too narrow because such statements will not contain all the main points.

Step V: Glance through the passage again:- This is the time to take out the passage and look through again to see how much of it has been understood. You should also read through the statement and add the missing points.

- Therapist once again went over the five steps of Summarization and she told them that in subsequent sessions, they would be taken through the practical application of the steps.

4. Self-Reinforcement:

Subjects should be made to reinforce themselves by making the following positive statements:

"I need to improve in my academic work
I shall learn the Summarization technique
I shall not give up until I master it thoroughly!"

THE TRAINING SESSIONS

WEEK 4

Session I:

Summarization Steps I & II English Comprehension

Step I: Pre-view the passage

Step II: Read intensively

- The therapist trained the subjects to apply the first two steps of Summarization thus:

Step I:

- (i) The therapist distributed to the subjects the two books on which the pre-viewing training activities were based:

The Forest Is, Our Play-ground by M. Murphy & K. Onadipe.

- The therapist led the subjects to flip through the books one after the other, taking note of the title, the

author, the publisher, the content page, the number of pages, the number of chapters and the chapter headings etc.

- The therapist also handed to the subjects the passage to be previewed: Chapter 6 "Louis Pasteur" by G.P. McCallum (See Week 4, Session I, Appendix A). The subjects were led to pre-view the passage.

- Token (Verbal Reinforcement): The therapist issued encouraging remarks e.g., "Very Good," "Excellent," "Well done" etc each time the subject mentioned a relevant portion of the books and the passage previewed.

Step II: Read intensively.

- The therapist discussed with the subjects the psychological preparations and the behavioural activities involved in reading intensively:

(a) Set aside a particular time and space for studying.

All the materials needed for the study should be placed on the table e.g., a dictionary, a map etc.

(b) Keep away other items to avoid distraction.

(c) Secure a quiet and conducive environment for the study.

(d) Keep your mind clear of all worries.

(e) Read with full concentration.

- Modelling: The therapist modelled how to read intensively while the subjects paid attention, interpreted the cues provided by the therapist and asked questions.
- Rehearsal: Subjects were led to clear their tables of irrelevant materials capable of causing distraction, and to commence the real undisturbed reading with understanding. The therapist went round to give necessary assistance.
- Self Reinforcement: Subjects were encouraged to make the following positive self-statements:
 "I need to improve in my academic work and pass my examinations.
 I have been introduced to the Summarization study technique.
 I shall not give up until I master it thoroughly."

Session II:

Summarization Steps I & II:

Biology

- The therapist taught the subjects some Biology contents on which further practice in the use of Summarization Steps I & II will be based: using Chart I ("Digestion I"), the therapist engaged in the active teaching of study

content I: "Digestions I" (See Week 4 Session II Appendix A for Study Content I). Subjects were encouraged to participate fully in the lesson and to ask questions.

- Subjects were given copies of study Content I and they were instructed to study the notes at home, applying the first two steps of the Summarization technique.

WEEK 5

Session I:

Summarization: Step II:- Search for the key points
English Comprehension

- The therapist asked the subjects their experiences with the assignment given during the last training session. Problems encountered in their application of the first two steps of Summarization were discussed and solved subjects were encouraged to pay attention to the diagrams and study them thoroughly.
- The therapist told the subjects to bring out the Reading passage: "Louis Pasteur" and she trained the subjects to go through again, still with a pencil in hand to really search for and underline the key points in the passage. The attention of the subjects was

called to the position of the key sentences/key points: sometimes they are located at the beginning, middle or end of the paragraphs.

- Therapist applied Verbal Reinforcement each time the subjects located a correct key point.
- Subjects were given the Summarization Worksheet I (See Appendix D) and they were trained to write down the key points. The therapist carried along the whole class at the same pace to ensure proper training.

Session II:

Summarization: Step III - Search for the key points

- The therapist again engaged in an active teaching of Biology Study Content II: "Digestion II." With the aid of Chart II ("Digestion II"), the therapist gave a thorough explanation of the topic and she encouraged the subjects to participate fully and ask questions (See Week, Session II, Appendix A for the full detail of Study Content I).
- The therapist then distributed copies of Study Content II to the subjects to study from home applying the first three steps of Summarization.
- Self-Reinforcement: The therapist encouraged the subjects to utter some positive self statements as

Week 4, Session II.

Week 6

Session I:

Summarization Steps IV & V: Formulate Concise Statements and Glance through the passage again

English Comprehension

Step IV: Formulate Concise Statements.

- The therapist asked the subjects to bring out their assignment - Summarization, Steps I - III applied to Biology Study Content II. The therapist went round very quickly to inspect the assignment and to put a tick beside each key point correctly listed (Token Reinforcement). Subjects were encouraged to discuss freely any difficulty they had.
- The therapist told the subjects that the next step was to make some concise statements using the key points listed. Subjects were encouraged to put the actual passage ^{away} and the therapist distributed Summarization Worksheet II (See Appendix D) to the subjects and she then trained them to make the statements, calling their attention to the following hints:
 - (a) The statement should be concise to avoid boring and time-consuming write-ups.

- (b) Complete sentences need not be insisted upon always.
 - (c) Avoid statements that are too narrow because such sentences will not take all the relevant points.
 - (d) Avoid statements that are too broad because such statements would contain irrelevant and extraneous materials.
- The therapist went through the worksheet and the sample statements given she encourages the subjects to formulate their own statements with the key points.
 - The therapist applied Verbal and Self Reinforcements as before.

Step V: Glance through the passage again.

- The therapist told the subjects that they were free to bring out the passage again to look through so as to check how correctly they have been able to summarize it, and to include the missing points.

Session II:

Step IV: Make concise statements (with the key points) and Step V: Glance through the passage again.

Biology

- The therapist used Chart IIIa ("The Female Reproductive Organ") and Chart IIIb ("The Male Reproductive Organ") to teach the subjects Study Content III "Reproduction" (See Appendix A for details). She explained the topic

thoroughly and ensured subjects' full participation in the lesson. Subjects were encouraged to ask questions as the lesson went on.

- The therapist then distributed copies of Biology Study Content III to the subjects for home assignment: they were to study it applying all the five steps of Summarization learnt.
- The therapist collected the subjects' summarization notebook during the week to grade them for ready feedback during the next session.

THE PRACTICE SESSIONS

WEEK 7

Session I:

English Comprehension

- The therapist opened session 7
 - with a revision of the five steps of the Summarization technique:
 - (1) Preview the passage
 - (2) Read intensively
 - (3) Search for the key points
 - (4) Formulate concise statements
 - (5) Glance through the passage again.

- The therapist gave out copies of Practice Passage I "Eze Learns a Lesson" (see Appendix A, Week 7(I) for the full text of the passage) to the subjects, and led them to apply the five steps of Summarization. The therapist monitored the step by step application of the technique and made the whole class go on at roughly the same pace. She provided assistance where necessary and ensured that each step was correctly applied.
- Verbal Reinforcement: The therapist issued encouraging remarks to make the subjects put in more effort.
- Token Reinforcement: The therapist went round to put a tick beside each correct application of the steps.

Session II:

Biology

- The therapist gave the subjects some feedback from the last assignment done: the subjects were given back their summarization notebook to check through to see their performance.
- The therapist actively undertook the teaching of Biology Study, Content IV - "Fertilization/Sex Determination" (See Appendix A, Week 7(II) for full text of Subject, Content IV using Charts IV(a)

"Fertilization" and IV(b) "Sex Determination" to give thorough explanation of the content and the diagrams. Subjects were encouraged to actively take part in the lesson and ask questions where necessary.

- Assignment: The therapist distributed to the subjects copies of Study Content IV; they were to study it using Summarization technique.
- The therapist collected subjects' Summarization notebook during the week for grading.

WEEK 8

Session I:

English Comprehension

- The therapist revised the five steps of Summarization with the subjects.
- The therapist distributed Practice Passage II: "The Great Elephant Bird (See Appendix A, Week 8(II) for full text of the passage) to the subjects and she got the subjects to tackle reading and comprehending it using the Summarization technique.
- The therapist went round to give assistance when necessary: subjects were allowed to go on independently at their own pace to encourage self-monitoring of the technique application.

- The therapist applied Verbal and Token Reinforcements (as in previous sessions) as she went round to mark their work.
- Subjects were encouraged to reinforce themselves by making some positive self-statements to boost their morale and pledge the determination to use the Summarization technique to study all their subjects.
- The therapist then discussed with the subjects the strategies for maintaining this newly acquired technique in natural setting:
 1. Always study where there are no distractions.
 2. Maintain a place and time-habit of study.
 3. Avoid procrastination.
 4. Keep a free mind;
 5. If you encounter any distraction at study, leave that place and look for a more suitable place.

Session II:

Biology

- Feedback: The therapist distributed subjects' Summarization notebook and she engendered a general discussion about subjects' performance; she further encouraged them to persist in the use of the technique in all their subjects.

- The therapist called the subjects' attention to the fact that they should try their hands at reproducing the diagrams or at labelling already drawn diagrams when they came to Step IV of technique.
- Active Teaching: The therapist taught Biology study content V: "Secondary Sex Characteristics (See Appendix A, Week 8(II) for full text of the study content to the subjects making use of Chart V "Family Tree" for full explanation of the content and the diagram.
- The therapist then distributed copies of Study Content V to the subjects as their assignment; they were to study it from home applying the Summarization technique.
- Subjects were to submit their Summarization note-books during the week for grading and ready feedback during the next session.

WEEK 9

Session I:

- The therapist distributed Practice Passage III to the subjects ("The Wrestlers." See Appendix A, Week 9 9(II) for full text of the passage).
- The subjects were encouraged to study the passage using the Summarization technique. Subjects were allowed allowed to apply the technique step by step

at their own pace. This was to ensure self-monitoring and self-sustenance at using the technique.

- The therapist, however, went round to give assistance and encouraging remarks in appreciation of subjects' efforts (Verbal Reinforcement).

Token Reinforcement: The therapist put a tick beside each step of the technique correctly applied.

Session II:

Biology

- The therapist repeated the first two steps of Week 8, Session II.
- The therapist undertook the active teaching of Biology Study Content VI: "Health and its maintenance "(See Appendix A, Week 9(II), for full text of Study Content VI). Subjects were encouraged to participate fully in the lesson and to ask relevant questions.
- Subjects were given copies of Study Content VI to study from home using the Summarization technique. Subjects were also reminded to use the new technique when studying all the other school subjects. They were encouraged to refer any difficulty encountered to the therapist. All the diagrams, tables and figures they

came across in their studies should be handled under Step IV.

- Subjects' Summarization notebooks were collected during the week and returned to them.

Weeks 10 & 11

Post Tests

The therapist gave the subjects post-tests in the same way pre-tests were given, (See Weeks 10 & 11 under 'Treatment Package' in Chapter II).

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APPENDIX C(i)SQ3R WORKSHEET I

Step I: Survey	Step II: Question
(i) Title/Heading of the passage	What is the title/heading of passage?
(ii) Sub-headings	Are there sub-heading?
(iii) Length of the passage	-----
(iv) Number of paragraphs	-----
(v) Type of passage: Prose, Play, Poetry	-----
(vi) Form of writing Conversational expository	-----
(vii) Words in italics, bold face, words underlined	-----
(viii) Question position	-----

APPENDIX C (ii)SQ3R WORKSHEET IIStep IV: Recite

Points read in the passage:

1st page

- (i) Jack went to the library
- (ii) Borrowed a book on Louis Pasteur
- (iii) Louis Pasteur, a chemist, born Dec. 27th 1822.
- (iv) -----

2nd page

- (i) Pasteur stressed "Will, work, success"
- (ii) Pasteur stated; Fermentation is the result of tiny organism found in the air.
- (iii) -----
- (iv) -----

3rd page

- (i) Found the cause and cure of cholera
- (ii) -----
- (iii) -----
- (iv) -----

APPENDIX D(i)

Summarization Worksheet I

Step III: Search for the key points

Page I:

Library, Book on Louis Pasteur, a chemist,

Page II:

Pasteur's guide words. Fermentation, silk worms etc.

Page III:

Cause and cure of cholera; rabies-preventive treatment,

Pasteur Institute

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APPENDIX D(ii)Summarization Worksheet IIStep IV: Make concise statementsPage I:

Jack Martin went to the library. Borrowed a book on Louis
Pasteur who -----

Page II:

Pasteur's guide words were: Will, work and success. Stated
that fermentation is the result of tiny organisms in the air--

Page III:

Pasteur discovered (i) Cause & cure of cholera
(ii) Preventive treatment of rabies. Became the Director
of Pasteur Institute, Paris. -----

APPENDIX E (1)RAVEN'S STANDARD PROGRESSIVE MATRICESKEY

	A		B		C		D		E	
1	4		1	2	1	8	1	3	1	7
2	5		2	6	2	2	2	4	2	6
3	1		3	1	3	3	3	3	3	8
4	2		4	2	4	8	4	7	4	2
5	6		5	1	5	7	5	8	5	1
6	3		6	3	6	4	6	6	6	5
7	6		7	5	7	5	7	5	7	1
8	2		8	6	8	1	8	4	8	6
9	1		9	4	9	7	9	1	9	3
10	3		10	3	10	6	10	2	10	2
11	4		11	4	11	1	11	5	11	4
12	5		12	5	12	8	12	6	12	5

STANDARD PROGRESSIVE MATRICES

ANSWER SHEET E(ii)

Name _____ Age _____ Date of Birth _____

School _____ Class _____

Town _____

Home Address _____

Father's Job _____

Your own Job _____

A		B		C		D		E	
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5		5		5		5		5	
6		6		6		6		6	
7		7		7		7		7	
8		8		8		8		8	
9		9		9		9		9	
10		10		10		10		10	
11		11		11		11		11	
12		12		12		12		12	

Time	Total	Grade

Tasted by _____

APPENDIX FEnglish Comprehension Test

Instructions: Read the following passages carefully and answer the questions at end of the passages. Write down only the letters of the correct answers. DO NOT WRITE ANYTHING ON THIS QUESTION PAPER.

PASSAGE I

Efficiency in reading is not acquired overnight. It is something one develops over a long period of time, with practice. While the practice continues, it is essential that one shakes off a number of practices which lower reading speed and reduce comprehension. Let us examine a few of such practices in this passage.

To start with, a person who whispers the word to himself, moving the lips as he reads, cannot read fast. Why? For the simple reason that he is very much like the person reading the words aloud. Both are similarly moving the lips, only that one is pronouncing them inaudibly. Now, a person who is speaking can never cover as many words as another who is reading entirely silently. Pronouncing the words reduces the number of words one can possibly cover at a time, because it makes one to focus on one word at a time - the one being

pronounced. This happens whether one is reading aloud or whispering to one's self.

Moreover, tracing the lines with one's finger reduces the rate of reading considerably. The reason is simple - the finger can touch one word at a time. And this tends to limit one to a word at a time. It is exactly like a person fixing his eyes on one word at a time. This trait of tracing the lines with the finger is much similar to what a child learning to read does. He tries to recognise one word at a time. Sometimes he has to struggle with the word, spelling it and thinking about it before he can proceed to the next word. Very old people with poor eye-sight often do it too.

Now you are not learning how to read. So you have no cause to pronounce a word silently before you grasp its meaning. The eyes and the brain, and not the lips, should do the reading. You are neither a beginner, learner nor a very old reader. So- you have no cause to trace the lines with the finger. Stop moving your lips, stop moving your finger across the page. Then you will read fast.

When reading a book, we need to ask ourselves whether we are reading with the eyes or with the head. This question

is crucial because a number of people have cultivated the practice of moving the head from the left to the right as they follow the words from the left to the right across the page. The practice does not encourage fast reading because it tends to fix one's head and eyes to some specific words, and the head does not move on to other words until the mind has thoroughly digested the words one after the other. It is very much like what happens with tracing the lines with the finger.

Equally bad is the practice of stopping on some difficult or strange words to check up the meaning in the dictionary, come to think of it. It takes about a whole minute even for a mature reader to check up the meaning of a word in the dictionary. That is much precious length of time. And if you have to check up the meanings of two or more words from the dictionary while reading a short passage, then you waste very many precious minutes. The ideal is to try to deduce or reason out the meaning of a difficult word. If you have been following the passage carefully, you should be able to reason out the meaning of a word from the way it is used in the passage.

Finally, think of the so many minutes a person wastes by going back to consider a word one has passed over earlier on. This is called regression, and it is a mark of immaturity in reading. While it may be conceded that one has the natural tendency to look at a strange word a second time, when one does this too often, it becomes an incurable habit, something one does with almost every key word. It is ideal to train one's self to resist the urge to go back to any important word in a passage. Just let your mind absorb it, reason out its possible meaning, and leave it alone.

To sum up, a good reader should hold the head in one constant position, do an intelligent guessing of the meaning of difficult words, and resist the urge to go back to a strange or difficult word.

Questions:

1. From the opening paragraph, we can say the writer's intention in this passage is to
 - (a) analyse a number of dos and don'ts about reading.
 - (b) discuss how to practise fast reading techniques.
 - (c) analyze factors that reduce reading efficiency.

- (d) analyze factors that promote reading efficiency.
(e) inform readers about various forms of reading.
2. Why does a person moving the lips read much more slowly than one whose lips never move?
- (a) Readers pronouncing the words internally or externally deal with one word at a time.
(b) A person moving his lips is held down by difficult words.
(c) A person moving his lips tends to focus on strange words.
(d) A person whispering to himself tends to disturb himself with his own whispering.
(e) All of the above.
3. Why does tracing the lines with the finger reduce reading rate?
- (a) The finger stays longer on strange words.
(b) The finger cannot be as fast as the eyes.
(c) The finger often stays to the wrong line.
(d) The finger tends to make one focus on one word at a time.
(e) The reader becomes tired and unable to read.
4. In what way is a child learning to read much like an old person trying to read?
- (a) Both have poor eye-sights.
(b) Both aid their comprehension with the finger.
(c) In both cases, much of spelling of words is done.
(d) Both cannot go to the next word until they have finished with one.
(e) Both are very inexperienced.
5. What assumption does the writer make about the reader of this passage?
- (a) That the reader is in-between a child and an old man.
(b) That the reader does not practise any of the poor reading habits.
(c) That the reader is already a fast reader.
(d) That the reader has achieved so much in life.
(e) That the reader has achieved so little in life.

6. What does a person fixing his eyes on words have in common with a person tracing the words with his fingers?
- (a) They read at a considerably reduced rate.
 - (b) They undertake simple reading always.
 - (c) They are limited to a word at a time.
 - (d) 'b' & 'c'.
 - (e) 'a' & 'c'.
7. Efficient reading involves mainly
- (a) the brain and the lips.
 - (b) the eyes and the brain.
 - (c) the fingers and the brain.
 - (d) the eyes and the fingers.
 - (e) the eyes and the lips.
8. By saying 'reading with our head' the writer means
- (a) following the ideas very closely.
 - (b) storing the prints in the reader's head.
 - (c) saying the words as one reads them.
 - (d) reading with one's head correctly balanced.
 - (e) moving the head as one reads the words.
9. Moving the head across the page and tracing the lines with the finger are much alike because
- (a) in each of them, something is moving.
 - (b) both tend to make one whisper one word at a time.
 - (c) each one makes one study words too closely.
 - (d) both fix one's attention to one word at a time.
 - (e) both the head and the fingers are parts of the body.
10. Checking up words' meanings in the dictionary does not encourage rapid reading because
- (a) it takes time to check words from the dictionary.
 - (b) dictionaries often give imprecise meanings.
 - (c) it is often not easy to find a word in the dictionary.

- (d) this makes a reader focus his attention on two books at a time.
- (e) the dictionary may not be available all the time.
11. What does the writer recommend regarding difficult or strange words?
- (a) Ignore them entirely.
- (b) Skip such words and rely on other words.
- (c) Replace such words with other words.
- (d) Guess the meaning of such words.
- (e) Deduce the meanings as used in context.
12. What do you think is the most important factor responsible for regression?
- (a) Indulging one's self with the use of the dictionary.
- (b) Finding a word difficult or strange.
- (c) Fixing one's eyes on a word.
- (d) Believing that one cannot reason out the meanings.
- (e) Wanting to use words within their context.
13. Regression in reading is common with
- (a) people who are very experienced at reading.
- (b) people who do plenty of reading.
- (c) people whose reading is disturbed.
- (d) people who have little to read.
- (e) people who are inexperienced at reading.
14. According to the passage, efficient reading is hindered by
- (a) tracing the words with one's finger.
- (b) whispering the words to oneself as one reads on.
- (c) moving one's head from left to right.
- (d) all of the above.
- (e) none of the above.

PASSAGE 2

The conditions under which you read are often as important as your habits of reading. To read under very poor light is to strain your eyes. Often, when the light is too dim, you may have to interrupt the reading and move to an area where there is more light or you adjust the angle at which the book is turned towards the source of light. The strain on the eyes caused by the poor light, is often similar to the strain suffered when one has bad eye-sight.

Moreover, for a person with normal eye-sight to read with glasses could be disastrous. If a person with normal eye-sight tries on a pair of glasses normally used by a friend, then he would not see properly, or he may suffer a lot of strain. Similarly, to read with dark glasses under the shade is to create some problem for the eyes. The fact is that one should read under conditions much similar to what the eyes are normally used to.

Music, we know, is a stimulant to many human activities. Some people work better when there is some form of soft music from a recorder. But music of any kind does not seem

to help the exercise of reading. Much as the brain is a most versatile organ, it allows a man to cope with only one activity at a time. If you try to listen to music, or worse still news, while you are reading, then you will find yourself either coping with the reading and not the music, or with the music and not the reading.

Also, it has been established that a person's reading rate and comprehension level vary according to the stage reached on a reading task. When a person is just starting a new book, the enthusiasm for the book makes the reading smooth and fast. But when the initial enthusiasm drops, after the first chapter or so, then the reading becomes more tedious and slower. This persists till one is approaching the end. At about a chapter or two to the end, the reading rate picks up, and the reading is much smoother. These facts account for why a person tends to remember facts from the beginning and end of a novel much more than those from the middle. To some extent, this is what happens with a passage, especially a long one.

The efficient reader does not only read quite often, he also reads with an alert mind. As he reads along, he

allows himself to communicate with the author. He does not read passively but actively. So, he discusses the ideas as he reads along. For instance, as he reads a detective story, he constantly asks questions. "Will the robber be caught by the policeman?" "Oh, why should a man say such a thing to an officer of the law?" He also tries to predict and judge. So, he could say to himself, "No man ever does this kind of thing and gets away." "Well, that serves him right." "I suppose this chap is being prepared for the gallows; he has no other place to end up."

In this matter, with a lot of anticipation for what is to happen, the mind is kept eternally active. Anticipation quickens the pace of reading, and also sharpens comprehension. This is why it has been claimed that the faster reader comprehends more. It is because the mind is fully opened to allow ideas flow in unhindered; because the mind is made to use the ideas; and because the thinking ahead allows the mind to analyse the relationships between one thing and another.

The active reader will never complain about what materials there are to read. Perhaps he has to read and establish what the theme of a novel is before the next literature class; he

also wants to read about a football match as reported in the day's papers; and he has to read his economics textbook to find out what the law of diminishing returns is all about. Yet, he has only a very limited time at his disposal. He would carve out the time to read everything all the same, only that he has to zoom through some, trot through some, and wade through others. An efficient reader, then reads meanings and ideas rather than individual words. He deals with the totality of the words rather than focus on individual words. He is too busy reacting to the reading to be able to see individual words.

Questions

15. The effect which poor light has on one's reading
- (a) results in one suspending the reading;
 - (b) causes one to go back to words already passed over.
 - (c) makes one not to comprehend the passage.
 - (d) leads to disgust for the reading.
 - (e) is similar to the problem caused by bad eye-sight.
16. Using a friend's eye-glasses
- (a) could promote reading efficiency.
 - (b) makes one to stumble over the printed pages.
 - (c) reduces one's comprehension ability.
 - (d) could cause strain similar to that caused by bad eye-sight.
 - (e) could create some problems for the owner of the glasses.
17. Why should one not read while listening to music?
- (a) The brain cannot cope with two things at a time.

- (b) One enjoys reading partially and music partially.
 - (c) One enjoys neither the music nor the reading.
 - (d) Music may make a person doze off while reading.
 - (e) One enjoys the reading and the music equally.
18. Why do a person's reading rate and comprehension level reduce when getting half-way with the passage or a book?
- (a) The middle is usually the most difficult.
 - (b) The concepts in the middle are most complex.
 - (c) Enthusiasm drops at that stage.
 - (d) The middle is usually the least interesting.
 - (e) The middle is usually the most interesting and difficult.
19. What effect does reduction in reading rate and comprehension level (when getting half-way with a book or passage) have on one's performance?
- (a) One often reads the beginning and the end only.
 - (b) Many people often read the end more carefully in order to remember the facts.
 - (c) Many people often remember facts more from the middle.
 - (d) Many people often dodge reading the middle.
 - (e) One often remembers facts more from the beginning and the end.
20. The best conditions recommended for reading are
- (a) those newly created during the reading.
 - (b) those the eyes are accustomed to.
 - (c) those specially arranged for the reading.
 - (d) those made brighter to aid the reading.
 - (e) those slightly shaded from the bright sun.
21. Reading with dark glasses under the shade
- (a) is the best condition for reading.
 - (b) assists the eyes to focus right.
 - (c) keeps the eyes in good state always.

- (d) cannot be done for a long time.
(e) gives the eyes a difficult task to do.
22. What does the writer mean when he says the efficient reader communicates with the author?
- (a) He discusses directly with the author.
(b) He tosses up the writer's ideas in his mind.
(c) He intentionally decides to disprove the author's ideas.
(d) He readily accepts everything the author says.
(e) He exchanges ideas with the author.
23. The fast reader may comprehend more because he
- (a) covers more words.
(b) makes his mind to use the ideas in the passage.
(c) thinks ahead and analysis the author's ideas.
(d) anticipates what is to happen, and it very active.
(e) keeps his mind open always.
24. What does the word "anticipation" mean?
- (a) Elaboration
(b) Premonition
(c) Forestalling
(d) Prediction
(e) Expectation
25. When the writer says the good reader will never complain, what do we understand the reader will never complain about?
- (a) Having to read for too long.
(b) Having to read difficult material.
(c) Having to read uninteresting materials.
(d) Having too much to read.
(e) Having too little to read.

26. What does the author mean when he says the reader has to zoom through some materials, wade through some, and trot through others?
- (a) That he has to be persistent at reading the materials
 - (b) That he has to vary his reading speed according to the content
 - (c) That he has to read the same way no matter how different the materials are.
 - (d) That he has to vary the kinds of materials that he reads.
 - (e) That he has to vary his interest for the different kinds of materials he reads.
27. What does the writer mean by saying that a reader reads meanings and ideas rather than words?
- (a) The reader has next to nothing to do with individual words.
 - (b) The reader focuses more on the section where the meanings and ideas are.
 - (c) The reader emphasizes overall meaning and ideas rather than individual words.
 - (d) The meanings and ideas are more glaring to the reader than the words.
 - (e) No word can be read unless the reader attaches the meanings and ideas.
28. The active reader would carve out the time to read everything suggests that
- (a) the active reader finds time out of his tight schedule to attend to all his reading work.
 - (b) the active reader sets aside a particular time for reading.
 - (c) the active reader can read everything within a specific time.
 - (d) the active reader reads everything he comes across.
 - (e) the active reader can do plenty of reading within a minimum time.

PASSAGE 3

It was barely five in the morning. Right from outside the window nearest his pillow, the sound of someone sweeping filtered through. An incurably late sleeper, Mr. Sola Adeola normally slept soundly till daybreak. But the stubborn sound of the broom filtered through and disturbed his sleep.

At first he assumed it must be his niece Lola; but then he remembered that Lola hardly ever got up before six. Who else could it be then? Ukechi? He peered at the other bed; she was on bed all right. Yet the sweeping continued until it faded away. Whoever the person was, she (or could it be he?) must have finished sweeping. Lola it must be, he concluded. He fell back on to his pillow, sleeping again, till Ukechi woke him up.

"Sola, morning, ready for school."

"Oh-h-h, Ukechi, morning," Sola greeted his wife.

"Yes, dear."

"Was 'Lola sweeping outside before day-break?"

"Lola? Oh yes. She normally sweeps; but that's when I'm cooking."

"Somebody was sweeping, before day break."

"You were dreaming perhaps?"

"No, I heard someone sweeping."

"Can't be. I woke Lola up when I was going to the kitchen; at six."

"Well, maybe I was... all right, Ukechi. Bye."

"Bye bye."

The following morning, at half past five, Sola woke her up.

"Listen carefully, Ukechi."

"What's it, Sola?"

"Oh, talk quietly. Listen carefully. Who's that sweeping?"

For long minutes, the couple felt a strange sense of fear. Gingerly stealthily, they seached through the house. Lola was on bed, snoring. For the next half hour, they listened helplessly until the sweeper finished with her (or his?) work, and walked away.

That day, Sola decided to build a fence with a strong gate, or employ a nightguard. They had continued to put the two issues forward for the past eighteen months since they moved into their then half completed house. However, a

block fence is not a structure one puts up over-night. Not, at least when a large plot of half an acre is to be covered. Not if you want a very strong, structurally flawless work. And not if you need to bargain with the bank manager for a loan or an overdraft. Sola settled on engaging a night-guard, at least meanwhile.

But he discovered night-guards were difficult to come by. One after the other of the polytechnic's night guards consulted merely promised to be on the look-out for any yet unengaged guard. Promises, promises, and yet more promises. The day ended without any hope of having a night guard within the next few days.

A strong matchet, a long club, and the sharp kitchen knife. Sola readied everything within his reach before going to bed. He wished he had had a pistol. This night, he swore, he would catch and possibly maim the strange person who constantly called to sweep.

But then, Sola reasoned, the strange sweeper might not be malicious. Whoever she (or he) could be had been coming for days and leaving quietly. Nothing had been found missing: nothing was tampered with. And, indeed, sweeping could not be regarded as an idea of a malicious mind. Sola reasoned he must handle the intruder cautiously. But, resolved he, catch

her he must.

When, the following morning, he heard the sweeping, he looked at his weapons, got up and dressed. It was half past five. He assured himself that this was not another dream. Dressed, matchet and club in hands, he marched into the sitting room. About to open the entrance door, his hands failed him. Fear gripped him. This time it was not the reasoning about the intent of the weeper that stopped him. It was a strange fear of the unknown.

He walked back into his room, and woke up Ukechi. They both listened, but couldn't act. They heard the sweeping ended, and the sweeper walking away. None talked.

"When Ukechi had left for school, Sola ate his breakfast quietly. Sadly, he pondered over this development about which he seemed helpless.

Sola then developed the habit of terminating his sleep a little after five in the morning. While not leaving his bed, all his senses would be at alert. Tamed by the strange sweeper who came regularly, he had thought of and dismissed, numerous explanations for the development. Gradually, Sola had built up in his mind a fearful image of the sweeper as a powerful fiend. This fiend of a sweeper must be caught,

he decided, even if he died in the process.

He opened his eyes wide, and watched the seconds of his watch tick by. Then half past five. No sound yet. Perhaps the devil knew she (or he?) was being awaited today. Soon, however, the sound filtered through the window pane. Sola carefully peered through and saw the figure. He carefully opened the door and measured his steps towards the outside.

Nearer he went. By now, only a few steps separated him from her. He decided to hold her from behind, descending like lightening on her. One step, then another. Then, up stood the figure, looking back. The tall slender frame transfixed Sola. He stood still and surveyed her.

"Good morning, Sir."

"Yes, morning."

He was at a loss as to what next to say. So was she. Apparently he had not expected this civil turn of events. Here was she talking in human language, and, from what he could see, she was smiling. At last, Sola heaved.

"Who are you?" he asked.

"Elizabeth, Sir."

"I don't know you."

"Your wife knows me," she said. "I am her student."

"Student? student?" It was almost incredible to him that the fiend could turn out to be a student.

Questions:

29. Mr. Sola Adeola was disturbed by the thought of someone sweeping his compound because
- (a) of its timing.
 - (b) no one in the house usually swept that way.
 - (c) none in the household could be sweeping.
 - (d) he reacts to sweeping done at any time.
 - (e) no one in the house told him to expect such a favour.
30. After waking up from his sleep, he listened and then slept again, because
- (a) the sweeping was done far away from him.
 - (b) he was particularly tired the previous night.
 - (c) it was a very cold night.
 - (d) the sweeping sent him back to sleep.
 - (e) he normally slept late and woke late.
31. When Ukechi was leaving for school, her husband was
- (a) ready for breakfast.
 - (b) also ready for work.
 - (c) still sleeping.
 - (d) still in bed.
 - (e) getting ready to call for help.
32. Although the couple was sure a stranger was sweeping outside the house, Mr. Adeola could not act because he
- (a) did not fully decide on what to do.
 - (b) was somewhat afraid of the strange sweeper.
 - (c) had decided to leave the sweeper alone.
 - (d) had not got enough weapons to fight the sweeper.
 - (e) was indifferent about the sweeper.

33. He did nothing to keep the sweeper out, though he wanted to because
- (a) he was unable to build a fence quickly.
 - (b) the night-guards were afraid of sweeping in such a house.
 - (c) he had decided to leave the sweeper alone.
 - (d) he could not get builders to erect a fence.
 - (e) the fence was not strong enough.
34. Why had Mr. Adeola thought of attacking the sweeper?
- (a) He thought the person had bad intentions.
 - (b) He thought the person was a spirit.
 - (c) He thought the person was a thief.
 - (d) He thought of teaching the sweeper a lesson.
 - (e) He didn't reason about it.
35. Which is not a reason for Mr. Adeola's inability to build the fence?
- (a) He had no money.
 - (b) A fence takes some time to build.
 - (c) Mr. Adeola wanted to fence a large area of land.
 - (d) Mr. Adeola wanted a thoroughly built fence.
 - (e) Mr. Adeola could not get any approval to build the fence.
36. In the passage the impression created about night guards is that
- (a) their job is very risky.
 - (b) people respect them a lot.
 - (c) they are always in high demand.
 - (d) they always make promises that are not fulfilled.
 - (e) they are always unengaged.
37. Mr. Adeola wanted to use the machet to
- (a) fight off the possible attack by the sweeper.
 - (b) provoke the sweeper into a fight.
 - (c) kill the devil.
 - (d) frighten the sweeper.
 - (e) cut off the devil's neck.

38. When the girl, who had been thought to be a fiend appeared, Mr. Adeola was
- (a) angry.
 - (b) amused.
 - (c) surprised.
 - (d) please.
 - (e) happy.
39. Each time his sleep was disrupted, Mr. Adeola stayed in bed
- (a) praying and watching.
 - (b) listening and watching.
 - (c) dosing and praying.
 - (d) whispering and praying.
 - (e) whispering and talking.
40. Which word least describes Mr. Adeola's movement towards the devil?
- (a) Sadly.
 - (b) Carefully.
 - (c) Quietly.
 - (d) Slowly.
 - (e) Gently.
41. The best way to describe the mood of the sweeper is
- (a) sad and surprised.
 - (b) sorrowful and sympathetic.
 - (c) surprised and sympathetic.
 - (d) pleasant and cheerful.
 - (e) happy and surprised.

PASSAGE 4

Mr. Sola Adeola was on eighty kilometres an hour, through the narrow streets of Ibadan. Although the city slept at that dark hour, the road welcomed anything but speed. He heard his wife groaning at the rear seat, his mother comforting her. He wanted to look at the two women, but restrained himself. Rather he looked into the mirror to spy them. It was less than half a second, but the result was almost disastrous. The car ran into a deep gully right in the centre of the road. He swerved. The resultant skid nearly proved too costly. Recovering from the near mishap, he resumed the race.

The car drove through the open gate of the hospital and pulled up at the entrance to the emergency ward. As he jumped down and joined his mother to help Ukechi out, some hospital ward assistants stepped out to help. It was two in the morning.

As she was placed on the stretcher, Ukechi was still bleeding. From the intermittent squeezing of her face, the hospital hands knew she was under labour. They knew which doctor to call on phone. Meanwhile, the staff midwife ordered her wheeled off into the labour room. At the door,

Sola and his mother were stopped while Ukechi was wheeled in. Soon after, the nurse came back to collect her hospital card from Sola.

A little later, the senior midwife stepped out. Sola looked at her hoping to be re-assured by her appearance. But one couldn't decide anything from her look. She asked, "How many months is she?"

"Months? oh, I see, seven and half, almost eight."

"Was there any particularly striking incident before this started?" she continued, "I mean, something like a fall, fight, or ..."

"Oh, nothing of the sort; nothing at all."

She turned towards the room. Just then, Sola snapped after her. "Please, is the doctor coming?"

"The doctor, well, he has been informed on the phone. He should be here very soon."

"Is she all right?" Sola's mother asked.

"Don't worry, mama."

And the midwife went away, apparently eager to nip further questions in the bud. Mother and son were once again in a world of cold silence. Sola debated with himself various

actions he could possibly take - go for the doctor himself, walk in and comfort his wife whose sobs he could hear from outside, go to the nearby chapel and pray - but he dismissed each one and remained still. It was much later that someone walked quietly in.

"Good morning."

Sola started up, surprised at the suddenness of the greeting. He stared wide-eyed at the figure. It was the doctor.

"Morning, doctor."

He wanted to say many things, make a thousand request, narrate what had happened as vividly as he could. But the doctor glided away into the labour room as quietly as he had appeared. Somehow, Sola felt greatly snubbed.

An hour later, nurses dashed out and rushed back, taking with them one instrument or the other. Not one of them seemed in the mood to entertain any questions. They merely nodded when Sola and his mother greeted. It was agonising experience, this method of keeping him in the dark. He was however continually reassured by Ukechi's groans. That way he knew she was still struggling.

By day break, he was allowed into the labour room. To his dismay, the doctor was no-where to be found. It then occurred to him that the doctor had not stayed long with his wife but had left by the other door. Ukechi said she was assured by the doctor that she would soon be alright, that she had had an injection after some examinations, and that the doctor had been coming and going apparently shuttling between his office and the labour room. However, the groaning continued as did her profuse tears and moans that she was losing her baby which had chosen to come prematurely. Utterly at a loss as to what to do, fearing lest the worst might happen, Sola himself dropped his tears. It was then the doctor came back.

He looked at Sola who bent his head. The doctor didn't like what he saw. Tears shed by patients' relatives never helped. He would not allow this show where the patient needed encouragement and re-assurance. Gently, he showed Sola the door and bade him goodbye. Alone, he walked home.

Questions:

42. Although the road was narrow, Mr. Adeola could drive fast because

- (a) the road was a new one.
- (b) the road was fairly smooth.

- (c) the people there stayed away from the road,
- (d) he didn't care if he had an accident,
- (e) there were no other vehicles or people on the road.

43. Why did Mrs. Ukechi Adeola have to be helped out of the car?

- (a) She probably could not stand,
- (b) She was probably unconscious,
- (c) Her child was halfway out,
- (d) She could not step out smartly enough,
- (e) She was somehow dying away.

44. During the time between the admission of Ukechi into the labour room and the stepping out of the senior midwife, the latter was probably

- (a) writing prescriptions for Ukechi,
- (b) taking delivery of Ukechi's baby,
- (c) examining Ukechi and asking questions,
- (d) discussing with the doctor,
- (e) taking instructions from the doctor.

45. The words of the midwife apparently

- (a) were fully comforting to Mr. Adeola,
- (b) were totally disheartening to Mr. Adeola.
- (c) did not fully comfort Mr. Adeola.
- (d) did much to kill Mr. Adeola's spirit,
- (e) annoyed Mr. Adeola.

46. Mr. Adeola felt defeated when the doctor went into the labour room because

- (a) the doctor rejected his requests,
- (b) he couldn't express himself before the doctor left.
- (c) he was slighted by the doctor,
- (d) the doctor left before Sola could recognise him.
- (e) the doctor did not understand his request.

47. Why was Mrs. Adeola sobbing?
- (a) Her pains were too severe.
 - (b) The labour was not progressing well.
 - (c) The doctor told her something terrible.
 - (d) She remembered something terrible.
 - (e) Her pregnancy was not fully ripe.
48. Ukechi squeezed her face
- (a) when she wanted to breathe in properly.
 - (b) when other people were around.
 - (c) to warm the hospital staff.
 - (d) when she was in pain.
 - (e) to make her husband tremble.
49. How best can one describe Mr. Sola Adeola as he waited outside?
- (a) Annoyed.
 - (b) Confused.
 - (c) Happy.
 - (d) Embarrassed.
 - (e) Sorrowful.
50. The doctor walked quickly in before Sola could greet him because
- (a) he was pursued.
 - (b) he did not want anybody to see him.
 - (c) doctors don't like greeting people.
 - (d) he was in a hurry to see a patient.
 - (e) his friend was wanting for him in his office.

APPENDIX G

ITEM ANALYSIS OF ENGLISH COMPREHENSION TEST

ITEM NO	SCORING KEY	DIFFICULTY INDEX %	DISCRIMINATING POWER	ITEM NO	SCORING KEY	DIFFICULTY INDEX %	DISCRIMINATING POWER
1	C	48	0.56	26	B	48	0.46
2	A	52	0.49	27	C	52	0.53
3	B	54	0.60	28	A	49	0.48
4	D	49	0.53	29	C	54	0.54
5	A	50	0.58	30	E	49	0.57
6	E	53	0.47	31	D	46	0.60
7	B	47	0.58	32	B	51	0.49
8	E	51	0.42	33	A	50	0.55
9	D	49	0.57	34	A	52	0.50
10	A	52	0.46	35	E	47	0.59
11	E	54	0.61	36	C	45	0.65
12	B	48	0.55	37	A	51	0.49
13	E	46	0.52	38	C	48	0.56
14	D	53	0.48	39	B	48	0.61
15	E	47	0.50	40	A	54	0.45
16	D	52	0.45	41	D	53	0.56
17	A	49	0.59	42	E	49	0.62
18	C	54	0.66	43	D	52	0.58
19	E	48	0.52	44	C	54	0.47
20	B	51	0.57	45	C	45	0.56
21	E	54	0.49	46	B	52	0.53
22	B	46	0.47	47	E	48	0.49
23	C	49	0.53	48	D	46	0.60
24	E	50	0.56	49	B	53	0.45
25	D	53	0.58	50	D	51	0.48

Mean Difficulty of the test = %
 Mean Discrimination =

APPENDIX HBIOLOGY COMPREHENSION TEST

Instructions: Read the following passages carefully and answer the questions at the end of the passages. Write down only the letters of the correct answers. PLEASE, DO NOT WRITE ANYTHING ON THIS QUESTION PAPER.

Passage 1Reptiles

Reptiles are an important group of vertebrates in the tropics; they include lizards, snakes, tortoises, alligators and crocodiles. They have dry, scaly, water proof skin. The dry scales which completely cover their bodies prevent them from drying up. In this way, lizards are provided with suitable external covering for life on land. Most of them, except snakes, have two pairs of limbs, ending with claws on the digits and located at the sides of the body. Reptiles wriggle on the ground since support for their bodies above the ground is usually difficult to achieve. They have lost nearly all traces of adaptation to water. Reptiles are cold-blooded hence their body temperature is poikilothermal, varying according to the temperature of the environment. They bask in the sun during most of the day, except at the hottest time of the day when they seek the shade.

The lizard, of which the Agama type is the most common in Nigeria, is a reptile worthy of consideration. Lizards often live in groups of up to ten, and they are very active during the day time. The male lizards is usually more brightly coloured and bigger than the female or the young ones.

The lizard has a distinct wedge-shaped head separated from the trunk by a neck. Its tail, extending from the hind part of the cylindrical trunk, is about one and a half times as long as the remainder of the lizard. Brightly coloured, horny, overlapping scale, capable of colour change for disguise, cover the body in diagonal rows. The mouth can be opened wide to reveal identical conical-shaped teeth used for crushing mosquitoes, ants and beetles trapped on its sticky tongues before swallowing them.

The lizard uses its lungs for breathing and so its nostrils, situated above the mouth, remain permanently open. It has slightly protruding eyes protected by upper and lower movable eyelids, blinking membrane, and a ridge of scales. The eardrums are found behind and below the eyes in shallow depressions on the skin. During attack a lizard can detach a portion of its long tail which goes on wriggling for some

time while the lizard makes its escape. However, in time, a new tail, which is shorter than the original one, grows.

The legs of the lizard are bent outwards at an angle to the body, and this makes it difficult for it to raise its body from the ground. The inability to support its body constantly above the ground accounts for the swift forward dash which the lizard makes along the ground, up tree trunks, ceilings and walls. The claws at the end of the limbs are used to hold firmly to the surface climbed. When the lizard is not moving its whole body rests on the ground.

Lizards live in colonies containing about thirty females, many young immature lizards of both sexes, and a dominant male which attracts more female lizards into its territory but fights off any intruding adult male lizard. During courtship, adult female lizard attracts the male by posturing before the brightly coloured male. The male respond by chasing and mounting the female and then introducing its gamete to fertilize the eggs in the female. The eggs later develop and the female lizard digs a hole in the soil, lays between five to seven eggs there, and covers them with soil. The eggs increase in size by absorbing water from the surrounding soil and swelling to

several times their original size. There is normally no parental care, but after about six to seven weeks, the eggs hatch into young lizards and crawl to the surface of the soil to live normal life. The young lizards grow rapidly and by eighteen months they are fully matured.

Questions:

1. Which of the following statements is true of lizards?
 - (a) The male lizard is stronger than the female.
 - (b) The female lizard shows more parental care than the male.
 - (c) The male lizard is bigger than the female.
 - (d) The male lizard is fatter than the female.
 - (e) The female lizard is bigger than the male.
2. Reptiles live successfully on land because
 - (a) they have long tail covered with scales,
 - (b) they are vertebrates,
 - (c) they have dry scaly digits,
 - (d) they have two pairs of scaly limbs.
 - (e) they have dry scales on their bodies,
3. Which is the best reason for the lizards nostrils remaining open always?
 - (a) It breathes with its lungs,
 - (b) The lungs and nostrils are near,
 - (c) It has narrow lungs.
 - (d) The lungs and nostrils are far.
 - (e) It does not use the lungs.
4. Raising the body above the ground is difficult for the lizard because
 - (a) its movement is always swift.
 - (b) the lizard is heavy,
 - (c) the ground is usually rough,
 - (d) the temperature of the ground is suitable.
 - (e) its legs are bent outward.

5. In order to disguise a lizard
- (a) runs quickly to a short distance
 - (b) ceases to be brightly coloured.
 - (c) covers up its body
 - (d) changes the colour its horny scales
 - (e) climbs, quietly up a tree trunk
6. Which statement best describes a lizard's movement?
- (a) Jumping, climbing and running.
 - (b) Running, wriggling and jumping.
 - (c) Hopping, wriggling and climbing.
 - (d) Running, climbing and hopping.
 - (e) Wriggling, running and climbing.
7. A male lizard does all of these, except
- (a) admitting an adult male into its territory.
 - (b) attracting more female lizards.
 - (c) fertilizing the female's eggs.
 - (d) running quickly up ceilings and walls.
 - (e) chasing and mounting the female.
8. Which is true about courtship in lizards?
- (a) The male attracts the female.
 - (b) Both the male and female attract each other.
 - (c) The female lizard attract the male.
 - (d) Many male lizards attract the female.
 - (e) None of them attracts each other.
9. In a colony of lizards one is likely to find
- (a) many female lizards and the young ones.
 - (b) many female lizards, young lizards and one male lizard.
 - (c) many male and female lizards.
 - (d) many male lizards, one female lizard and young lizards.
 - (d) many male lizards and the young lizards.

10. In lizards
- (a) fertilization is internal.
 - (b) fertilization is external.
 - (c) fertilization is both internal and external.
 - (d) fertilization is neither internal nor external.
 - (e) fertilization does not take place.
11. The body of a lizard is divided into
- (a) head, trunk and tail.
 - (b) head, tail, trunk and neck.
 - (c) trunk, head, neck and tail.
 - (d) head, neck, trunk and tail.
 - (e) head, tail and trunk.
12. A lizard's tail is
- (a) as long as the remainder of the lizard.
 - (b) shorter than the remainder of the lizard.
 - (c) longer than the remainder of the lizard.
 - (d) neither longer nor shorter than the remainder of the lizard.
 - (e) longer and thicker than the remaining of the lizard.
13. After laying the eggs
- (a) the male lizard shows parental concern.
 - (b) lizards generally do not show parental concern.
 - (c) the female lizard shows parental concern.
 - (d) both male and female show parental concern.
 - (e) young lizards show parental concern.
14. Lizards' food consists mainly of
- (a) small leaves.
 - (b) seeds and leaves.
 - (c) insects and small leaves.
 - (d) seeds.
 - (e) insects.
15. The body temperature of the lizard is
- (a) constant.
 - (b) variable and constant.
 - (c) variable.
 - (d) neither variable nor constant.
 - (e) occasionally constant.

Passage IIFishes

Fishes are vertebrates specially adapted for life in water; they are found in rivers, lakes and coastal waters. They have stream-lined bodies covered with overlapping, waterproof scales. Fishes are cold-blooded since their body temperature is variable and it depends on the temperature of the environment. There is no external division between the head, body and tail of fishes, which makes it easy for them to move in water. The colouring of their scales allows for camouflage against enemies: their dark dorsal surface blends with the dark sea floor making it difficult for enemies from above to see them while their white ventral surface makes it difficult for enemies approaching from below to detect them.

There are two main groups of fishes, the cartilaginous and the bony fishes. The cartilaginous fishes (i.e sharks and rays) have skeleton made of a soft, flexible tissue called cartilage. The bony ones are the fishes whose skeleton is made of bone e.g., sardine, cod herring and tilapia. Fishes breathe by means of gills and this makes it impossible for them to breathe outside water. The gills

are heavily supplied with blood vessels, and are protected by the operculum. Water containing oxygen rushes into the gills and the oxygen is absorbed by the blood vessels of the gills, from where it is carried to the tissues. Beside the gills, some fishes have "lungs" which are actually swim bladders. Such fishes are able to float or sink by inflating or deflating the swim-bladders which are thin-walled gas-filled sacs.

Fishes have two eyes, each one lying on either side of the head. They have no eyelids, their eyes are protected by a transparent membrane. They have nostrils which are used for smelling only, since the ability to smell is very important to a fish. The nostrils are never used for breathing. Fishes can select their food by taste. Some fishes, which are carnivorous, eat other fishes smaller than themselves. Others which eat plants are herbivorous while those feeding on both plants and animals are omnivorous. They detect sounds and vibrations in the water by means of lateral lines which are sense organs.

The fins of fishes are modified into limbs which are used to swim as well as to guide themselves through the

water. They are three median unpaired fins: a dorsal fin on the back of the body, a caudal fin at the end of the tail and an anal fin below the tail. There are also the two apired fins: the paired pectoral fins behind the gill-cover, modified as fore-limbs; and the paired pelvic fins modified as hind-limbs, fishes move in water by swimming, brought about by the rhythmic contractions of the body muscles. For rapid movement, the paired fins are folded close to the body while the anal and the dorsal fins help to stabilize the body by preventing it from rolling sideways.

Fishes undergo sexual reproduction. Although most fishes reproduce by laying eggs, there are some which bear their young alive. In the first group, called oviparous, the male and female shed their spermatozoa and ova respectively into water where fertilization takes place externally. Such fishes usually leave the fertilized eggs to develop by themselves.

With the second group, called ovoviviparous, fertilization is internal; the female fishes retain the eggs within their bodies until they develop into young fishes.

Fishes are important sources of proteinous food to man. Some fishes are also used as fertilizers in the form of

nitrogenous compounds while some contain oils that are very rich in vitamin A & D e.g., cods, some adult fishes protect themselves by using weapons provided them by nature for attack and defence. For example, the shark has very sharp teeth, and the sword, fish can attack its enemies by using its long mouth which is modified to form a long sword.

Questions:

16. Fishes use their swim bladders for
- (a) moving fast in water.
 - (b) protecting the young ones.
 - (c) attacking their enemies.
 - (d) floating or sinking in water.
 - (e) rolling from side to side.
17. The omnivorous fishes feed on
- (a) plants and animals.
 - (b) plants, stones and weeds.
 - (c) plants only.
 - (d) weeds and insects.
 - (e) animals only.
18. Fishes use their lateral lines
- (a) to detect vibration.
 - (b) to digest their food.
 - (c) to eat other smaller fishes.
 - (d) to increase their weight.
 - (e) to protect themselves.
19. The oviparous fishes do all the following except
- (a) shed their spermatozoa and ova into water.
 - (b) produce young ones.
 - (c) provide a source of proteinous food for man.
 - (d) Stay by the fertilized eggs until they develop.
 - (e) engage in external fertilization.

20. Which is modified as fore-limbs?
- (a) Pelvic fins.
 - (b) Pectoral and anal fins.
 - (c) Pectoral and pelvic fins.
 - (d) Anal fin.
 - (e) Pectoral fins.
21. The body temperature of fishes
- (a) governs that of the environment.
 - (b) changes according to that of the environment.
 - (c) is reduced by that of the environment.
 - (d) takes over the functions of the temperature in the environment.
 - (e) constant all the time.
22. Fishes' eyes are protected by
- (a) the upper eyelid.
 - (b) the lower eyelid.
 - (c) a transparent membrane.
 - (d) both the upper and lower eyelids.
 - (e) none of the above.
23. The unpaired fins are the
- (a) dorsal, caudal and anal fins.
 - (b) pelvic, dorsal and caudal fins.
 - (c) pectoral, caudal and anal fins.
 - (d) dorsal, pectoral and pelvic fins.
 - (e) pelvic, anal and pectoral fins.

24. Fishes breathe by using their
- (a) nostrils.
 - (b) opercula.
 - (c) fins.
 - (d) gills.
 - (e) nostrils and gills.
25. How do fishes achieve rapid movement in water?
- (a) By breathing deeply.
 - (b) By stabilizing their bodies.
 - (c) Through the rhythmic contractions of the muscles.
 - (d) By folding the paired fins close to the body.
 - (e) By rolling sideways.
26. What helps fishes to camouflage against enemies?
- (a) The temperature of their bodies.
 - (b) The colouring of their scales.
 - (c) Their stream-lined bodies.
 - (d) Their cartilaginous and bony bodies.
 - (e) None of the above.
27. The gills are covered and protected by
- (a) the swim bladders.
 - (b) the blood vessels.
 - (c) the operculum.
 - (d) gas-filled sacs.
 - (e) the fins.
28. In fishes fertilization
- (a) is internal.
 - (b) is external.
 - (c) is both internal and external.
 - (d) is neither internal nor external.
 - (e) does not take place.

29. Which best describes fishes' usefulness to man?
- (a) They are a source of food.
 - (b) They are used as fertilizers.
 - (c) They contain useful oils.
 - (d) They contain plenty of protein.
 - (e) All of the above.
30. Fishes find it easy to move in water because
- (a) there is no external division between the head, body and tail.
 - (b) their bodies are light.
 - (c) they are both cartilaginous and bony.
 - (d) their gills are supplied with blood vessels.
 - (e) the colouring of their scales help them.

PASSAGE III

FRUITS AND SEEDS

Fruits and seeds are formed as a result of pollination and fertilization in flowers. The fruit of a flowering plant is the fertilized and ripened ovary containing fully developed ovules or seeds. However, in certain plants e.g., banana and pine-apple, asexual reproduction takes place and so fertilization is not necessary for fruit formation. Such fruits are often seedless.

In fruit formation, the wall of the ovary, or the fruit wall becomes the pericarp. In most fruits, the pericarp is made up of three layers: an outer epicarp, a

middle mesocarp and an inner endocarp. A fruit which develops entirely from the fertilized ovary is known as a true fruit while a fruit which develops not only from the ovary but also from the calyx, corolla and the receptacle is called a false fruit. Fruits can be classified as simple, aggregate and compound fruits. A simple fruit e.g. the bean pod, banana, tomato, is formed from a single flower. An aggregate fruit is formed from a single flower with an apocarpous pistil so that each carpel becomes a fruitlet. A compound or multiple fruit is formed from a bunch of flowers which are very close to one another, and all the fruitlets fuse together to form a single large fruit e.g., pine-apple.

Another possible classification is to group fruits into two: the succulent or fleshy ones and the dry ones. This classification depends on the nature of the fruit wall; fleshy fruits have soft and juicy walls while the walls of the dry fruits are dry, fibrous and woody. Fleshy fruits store large quantities of tissues. Dry fruits can be dehiscent or indehiscent. In a dry dehiscent fruit, the fruit wall breaks open to liberate the seeds e.g., bean, rubber, okro. In the dry indehiscent fruit the dry pericarp

are non-splitting; no matter how dry the fruit wall may be, the pericarp does not break open at all.

Fertilized ovules which have undergone growth and development produce seeds. Provided with the correct conditions, a fully developed seed grows into a seedling which later becomes a mature plant. During its development into a seedling, the seed is usually independent of the parent plant, and it must therefore have a store of food in it. Most seeds, however, contain a sufficient store of food to give the seedlings a good start in life.

A typical seed coat consists of two layers: the outer testa, and the inner tegamen. These two layers protect the seed from bacteria, fungi and other organisms which may do harm to it. The seed coat encloses an embryo which comprises a radicle (embryonic root), a plumule (embryonic shoot) and one or two cotyledons. A seed has a single scar or hilum at the point at which the funicle or ovule stalk was attached. The seed is attached to the placenta of the fruit by means of the seed stalk. The micropyle is a tiny pore situated near one end of the hilum. Through the pore water, and air are supplied to the embryo.

The most important part of the fruit is the seed for it contains the embryo which later grows into the mature

plant. The process during which the embryo develops into a seedling is known as germination. Seeds that remain alive in a dry condition for long periods without germinating still have the power to germinate under favourable conditions. While some seeds can germinate immediately after being shed from the parent plants, some have to pass through a dormant period lasting for weeks, months or even years before germinating.

Water is a highly essential factor for germination; it is usually absorbed into the seed through the micropyle, and the entire seed then becomes swollen. The cells of the cotyledons become inflated and active as they start to make use of the water to digest the food substances stored in them. The food substances are then transported to the growing plumule and radicle. Besides water, enzymes, produced by the cells of the cotyledons, are also required for the digestion of the stored food products. Other are also required for the digestion of the stored food products. Other necessary conditions for permination of seeds include air with an adequate amount of oxygen, and suitable temperature. It is also important that the seeds sown should be viable; only seeds that have life and are healthy will be able to

germinate and grow well.

After flowering, the fruits and seeds ripen, and fall from the parent plant to the ground. If conditions are favourable and all such seedlings develop close to the parent plant, they soon become over-crowded. To prevent this the fruits and seeds of most plants are variously adapted to ways by which they can be scattered far away to ensure the wide distribution of the seeds and the survival of a good number of seedlings. Such dispersal vegetation. The common agents by which dispersal of seeds and fruits is carried out are explosive mechanisms in the fruits themselves, animals, and water, and man.

Questions:

31. A suitable description for the pericarp is
- (a) the true fruit,
 - (b) the compound fruit.
 - (c) the false fruit,
 - (d) the fruit wall,
 - (e) none of the above,
32. One of the following is a major characteristics of succulent fruits.
- (a) large storage of water in the tissues,
 - (b) splitting pericarp,
 - (c) fertilized ovary.
 - (d) Asexual reproduction,
 - (e) little or no water in the tissue.

33. Which is an appropriate explanation for some fruits splitting open to release their seeds?
- (a) They mature earlier than other fruits.
 - (b) They have very thin covering.
 - (c) They are indehiscent fruits.
 - (d) They lack adequate water for growth.
 - (e) They are dehiscent fruits.
34. All the following are true of a typical seed coat except
- (a) it encloses the embryo,
 - (b) it is fibrous and dry.
 - (c) it has an outer layer.
 - (d) it protects the seed from bacteria,
 - (e) it has an inner layer.
35. For its growth into a seedling, the seed
- (a) is dependent on the parent plant for food supply,
 - (b) needs little food supply,
 - (c) does not need a store of food.
 - (d) needs no food, supply at all,
 - (e) is independent of the parent for food supply.
36. The following is a necessary condition for the formation of a compound fruit,
- (a) A bunch of flowers.
 - (b) A mature flower.
 - (c) A bunch of flowers with one carpel.
 - (d) A single flower with many carpels.
 - (e) None of the above.
37. In asexual reproduction in plants
- (a) both pollination and fertilization are present.
 - (b) only pollination is present.
 - (c) both pollination and fertilization are absent.
 - (d) only fertilization is present.
 - (e) pollination takes place before fertilization.

38. When you plant a seed and it germinates
- (a) the plant dies off,
 - (b) the embryo grows into a seedling,
 - (c) the seed remains buried in the soil,
 - (d) the seed is shed from the parent plant,
 - (e) the seed remains active.
39. Dispersal of fruits and seeds has all the following advantages except
- (a) ensuring that seeds are widely distributed,
 - (b) preventing over crowding,
 - (c) ensuring the growth of certain fruits and seeds in specific areas.
 - (d) covering sterile areas with plants,
 - (e) making the survival of many seedlings possible.
40. A true fruit develops from
- (a) the calyx,
 - (b) the calyx and the receptacle,
 - (c) the receptacle,
 - (d) the ovary,
 - (e) the ovary and the calyx.
41. The following are necessary conditions for seed germination.
- (a) Water and air,
 - (b) Air and enzymes,
 - (c) Enzymes and water,
 - (d) Suitable temperature and air,
 - (e) All of the above.
42. A bean seed had contact with water and it got swollen up. How did the water get into the bean?
- (a) Through the micropyle,
 - (b) Through the cotyledons,
 - (c) Through the plumule,
 - (d) Through the radicle,
 - (e) Through the hilum,

Passage 4Birds

Birds are the only group of vertebrates which have covering of feathers. They are warm-blooded, unlike fish, amphibians and reptiles which are cold-blooded. Their fore-limbs are modified as wings for flight while the hind limbs are modified for walking. Birds can be grouped into two types: the flying birds and the flightless birds, even though there are only a few flightless birds. Some birds have beautiful colours and voices attracting so much attention that some people engage in watching birds as a form of hobby.

A bird has a streamlined body with light feathers specially arranged so that air passes over the body easily. The skeleton of a flying bird is rigid and provides a firm framework on which the flight muscles are attached. The bones are light, hollow and thin, making the whole body light. Flying requires a lot of energy hence a lot of oxygen must be supplied for respiration. To meet this demand for oxygen a number of air sacs are connected to the lungs so that a large amount of oxygen is circulated to all parts

of the body at any given time.

Birds depend on their sense of sight for finding food, and therefore have well-developed eyes. There is a third eye-lid which cleans the eye and keeps it moist. Birds have no external ear, but just below and behind the eye lies the eardrum which is covered by feathers. The bird detects sound by the vibration of the eardrum. Its inner ear is well developed including the parts concerned with the sense of balance which is very important in flight. The mouth is modified to form a tough pointed beak which serves a number of functions. The beak is used for feeding, building of nests and protecting the eggs. Birds' beaks are specially adapted to suit the type of food they eat. Birds may be herbivorous, carnivorous or omnivorous. Birds that eat seeds have short, thick beaks which are used for picking up the seeds; those that feed on insects have long, slender, pointed beaks while the flesh-eating birds have strong, curved beaks for killing their prey and tearing the flesh.

Birds have no teeth, so they swallow small stones or grit which are stored in the gizzard and are used to grind the food into smaller particles before the food is digested.

There is an oil gland at the tail which secretes oil to grease the feathers and prevent them from getting wet easily. The wings of a bird when fully spread out, are not flat but slightly curved so as to allow air to pass more rapidly over the wings. The greater pressure of air thus created under the wings provides a lifting force. Birds' flights can be categorized into soaring, gliding and flapping.

Once a year, birds usually lose their old or damaged feathers and grow new ones to replace the lost ones. This process ensures that no portion of the bird is left bare at any time, and that flying is not difficult. When the bird is at rest the wings are folded over the sides of the body so that they do not disturb the bird when walking or hopping. Most birds have the ability to produce calls, special notes, or songs. The parrot, for example, has the power of imitating voices of people while the fowl produces notes to call its young, or warn them of any possible danger around.

Birds exhibit some courtship before mating. The male attracts the female by dancing and displaying the beauty of its plumage. When the female is won over, the male mounts her and discharges its spermatozoa to fertilize the soft eggs which are incubated for about twenty-one days to provide some warmth

to the embryo inside the egg. The embryo gradually develops into young bird which later emerges from the shell.

Questions:

43. Which of these is actively used when a bird is flying?
- (a) Hollow bones.
 - (b) Fore limbs.
 - (c) Hind limbs.
 - (d) The scales.
 - (e) All of the above.
44. A bird becomes sensitive to sound and vibration by using the
- (a) pinnas.
 - (b) ear.
 - (c) ear drum.
 - (d) feathers.
 - (e) oil gland.
45. Which of these gases is abundantly used by birds during flight?
- (a) Carbon dioxide.
 - (b) Oxygen.
 - (c) Nitrogen.
 - (d) Carbon monoxide.
 - (e) None of the above.
46. John spends his leisure taking active interest in the behaviour and activities of live birds. What type of hobby is he engaged in?
- (a) Bird catching.
 - (b) Nest building.
 - (c) Bird saving.
 - (d) Bird watching.
 - (e) Bird sparing.

47. The fused, light and hollow bones of birds enable it to
- (a) become light in the air.
 - (b) become heavy in the air.
 - (c) increase in size.
 - (d) decrease in size.
 - (e) engage in flapping.
48. Birds lose old feathers annually and grow new ones
- (a) to attract fellow birds.
 - (b) to make flying easy.
 - (c) to increase their weight.
 - (d) to decrease their weight
 - (e) for all the above reasons.
49. The beak of a bird is used for all of the following except
- (a) for feeding,
 - (b) for building nests.
 - (c) for protecting the eggs.
 - (d) for flying.
 - (e) for picking up food.
50. Of what use are the small stones swallowed by birds?
- (a) They help to grind birds' food.
 - (b) They provide greater pressure.
 - (c) They make birds carnivorous.
 - (d) They make the wings light.
 - (e) They provide greater force for flying.

APPENDIX I

Scoring key and Item Analysis of Biology Comprehension Test

ITEM NO	SCORING KEY	DIFFICULTY INDEX %	DISCRIMINATING POWER	ITEM NO.	SCORING KEY	DIFFICULTY INDEX %	DISCRIMINATING POWER
1	C	49	0.56	26	B	49	0.56
2	E	52	0.49	27	C	53	0.63
3	A	50	0.57	28	C	47	0.49
4	E	48	0.53	29	E	45	0.60
5	D	53	0.56	30	A	50	0.55
6	E	47	0.51	31	D	52	0.61
7	A	51	0.48	32	A	48	0.52
8	C	52	0.55	33	E	51	0.45
9	B	45	0.50	34	B	48	0.58
10	A	54	0.58	35	E	46	0.54
11	D	52	0.48	36	A	54	0.59
12	C	46	0.53	37	C	49	0.60
13	B	48	0.57	38	B	53	0.50
14	E	51	0.61	39	C	48	0.57
15	C	49	0.49	40	D	52	0.62
16	D	46	0.52	41	E	50	0.49
17	A	53	0.48	42	A	47	0.46
18	A	47	0.59	43	B	51	0.58
19	D	45	0.54	44	C	49	0.44
20	E	54	0.57	45	B	47	0.56
21	B	49	0.60	46	D	53	0.56
22	C	52	0.48	47	A	50	0.48
23	A	48	0.56	48	B	48	0.51
24	D	53	0.58	49	D	46	0.61
25	D	46	0.63	50	A	51	0.47

Mean difficulty of the test = 49.54%
 Mean Discrimination = 0.54

APPENDIX JEnglish Comprehension Attitude Scale

Please read each of the following statements carefully.
Circle the number on the alternative that best describes
your feeling.

1 = STRONGLY DISAGREE

2 = DISAGREE

3 = UNDECIDED

4 = AGREE

5 = STRONGLY AGREE

- | | | | | | | |
|----|---|---|---|---|---|---|
| 1. | I am always under a terrible strain in an
English Comprehension class | 1 | 2 | 3 | 4 | 5 |
| 2. | I do not like English Comprehension, and
it scares me to have to study it | 1 | 2 | 3 | 4 | 5 |
| 3. | English Comprehension is very interesting
to me. I enjoy comprehension courses | 1 | 2 | 3 | 4 | 5 |
| 4. | English Comprehension is fascination
and fun | 1 | 2 | 3 | 4 | 5 |
| 5. | Comprehension makes me feel secure and
at the same time it is stimulating | 1 | 2 | 3 | 4 | 5 |
| 6. | My mind goes blank, and I am unable to
think clearly when studying English Comprehension | 1 | 2 | 3 | 4 | 5 |

7. I feel a sense of insecurity when attempting English Comprehension. 1 2 3 4 5
8. English Comprehension makes me feel uncomfortable, restless and irritable and impatient. 1 2 3 4 5
9. The feeling that I have towards English Comprehension is a good feeling. 1 2 3 4 5
10. English Comprehension makes me feel as though I am lost in a jungle of words and can't find my way out. 1 2 3 4 5
11. English Comprehension is something which I enjoy a great deal. 1 2 3 4 5
12. When I hear the word English Comprehension I have a feeling of dislike 1 2 3 4 5
13. I approach English Comprehension with a feeling of hesitation, resulting from a fear of not being able to study Comprehension. 1 2 3 4 5
14. I really like English Comprehension 1 2 3 4 5
15. English Comprehension is a subject in school which I have always enjoyed studying. 1 2 3 4 5

16. It makes me nervous to ever think about
having to study English Comprehension. 1 2 3 4 5
17. I have never liked English Comprehension and it is my most dreaded
subject. 1 2 3 4 4
18. I am happier in an English
Comprehension class than in any other
class. 1 2 3 4 5
19. I feel at ease in English
Comprehension classes and I like it
very much. 1 2 3 4 5
20. I feel a definite positive reaction
to English Comprehension it is
enjoyable. 1 2 3 4 5

APPENDIX KBiology Attitude Scale

Please read each of the following statements carefully. Circle the number on the alternative that best describes your feeling.

1 = STRONGLY DISAGREE

2 = DISAGREE

3 = UNDECIDED

4 = AGREE

5 = STRONGLY AGREE

- | | | | | | | |
|----|---|---|---|---|---|---|
| 1. | I am always under a terrible strain in a
Biology class | 1 | 2 | 3 | 4 | 4 |
| 2. | I do not like Biology, and it scares me
to have to take it. | 1 | 2 | 3 | 4 | 5 |
| 3. | Biology is very interesting to me.
I enjoy Biology courses. | 1 | 2 | 3 | 4 | 5 |
| 4. | Biology makes me feel secure and at
the same time it is stimulating. | 1 | 2 | 3 | 4 | 5 |
| 5. | Biology is fascinating and fun | 1 | 2 | 3 | 4 | 5 |
| 6. | My mind goes blank, and I am unable to
think clearly when working Biology. | 1 | 2 | 3 | 4 | 5 |
| 7. | I feel a sense of insecurity when
attempting Biology. | 1 | 2 | 3 | 4 | 5 |

8. Biology makes me feel uncomfortable
restless and irritable and impatient 1 2 3 4 5
9. The feeling that I have towards
Biology is a good feeling. 1 2 3 4 5
10. Biology makes me feel as though I am
lost in a jungle of diagrams and can't
find my way out. 1 2 3 4 5
11. Biology is something which I enjoy a
great deal. 1 2 3 4 5
12. When I hear the word Biology, I have
a feeling of dislike. 1 2 3 4 5
13. I approach Biology with a feeling of
hesitation, resulting from a fear of
not being able to do Biology. 1 2 3 4 5
14. I really like Biology. 1 2 3 4 5
15. Biology is a subject in school which
I have always enjoyed studying. 1 2 3 4 5
16. It makes me nervous to ever think about
having to study Biology. 1 2 3 4 5
17. I have never liked Biology, and it is
my most dreaded subject. 1 2 3 4 5

18. I am happier in a Biology class
than in any other class. 1 2 3 4 5
19. I feel at ease in Biology classes
and I like it very much. 1 2 3 4 5
20. I feel a definite positive reaction
to Biology, it is enjoyable. 1 2 3 4 5

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APPENDIX L(i)

Department of Guidance & Counselling,
Faculty of Education,
University of Ibadan,
Ibadan.

15th June, 1989.

Dr. S.O. Ayodele,
Faculty of Education,
University of Ibadan,
Ibadan.

Dear Dr. Ayodele,

Permission to Use Passages From Faster Reading
For Better Comprehension.

I hereby seek permission to reproduce some passages from
your book:

FASTER READING FOR BETTER
COMPREHENSION

to build one of my instruments, English Comprehension Test,
for my Ph.D thesis.

Please, note that I shall necessarily need to merge some of
the passages to suit my purpose. I may use some of your
questions but I shall definitely set many more questions and
change the multiple-choice questions to five alternatives
instead of the four alternatives originally used.

I shall quite appreciate it if the permission is granted.

Thank you.

Yours faithfully,



Adesemowo, P. Oluremi (Mrs.).

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 (Oxon) M.A., Ed.D (U.S.D.) A.R.I.C.

OUR REF.:

YOUR REF.:

Institute of Education
 University of Ibadan
 Ibadan.

14th March, 1990.

Mrs P.O. Adesemowo
 Department of Guidance & Counselling
 Faculty of Education
 University of Ibadan.

Dear Mrs Adesemowo

Permission to Use Passages from
"Faster Reading for Better Comprehension"

Sequel to your letter on the topic stated above, I want to state that permission is hereby granted you to use the desired passages for your Ph.D. study. I am sure you will acknowledge this permission in your work.

Yours,


 Dr S.O. Ayodele

APPENDIX MLIST OF SCHOOLS USED FOR THE EXPERIMENTA. Validation of Instruments:

1. Oke-Ado High School, Oke-Ado, Ibadan
2. Community Grammar School, Oluyole Estate, Ring Road, Ibadan.

B. Pilot Study:

1. United Christians High School, Ijokodo, Ibadan.
2. Eleyele High School, Eleyele, Ibadan.

C. Main Study:

1. Urban Day Grammar School, Ring Road, Ibadan.
2. Eleyele Secondary School, Eleyele, Ibadan.