THE EFFECT OF USING CERTAIN TEACHING TECHNIQUES ON OVERCOMING LINGUISTIC DIFFICULTIES FACED BY POST-GRADUATE STUDENTS IN COMPREHENDING SCIENTIFIC TEXTS

A DISSERTATION SUBMITTED TO

THE COUNCIL OF THE COLLEGE OF EDUCATION/IBN RUSHD-UNIVERSITY OF BAGHDAD IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATION (TEACHING ENGLISH AS A FOREIGN LANGUAGE)

BY

INTISAR IBRAHIM HASSAN AL-SAMARRAI

SUPERVISED BY

PROFESSOR
'AYIF HABEEB
AL-'ANI

ASSISTANT PROFESSOR
DR. ABDUL-LATIF
AL-JUMAILY

1424A.H.

2003 A. D.

We certify that this dissertation has been prepared under our supervision at the University of Baghdad as a fulfillment of the requirements for the degree of doctor of Philosophy in Education (Teaching English as a Foreign Language).

Signature:
Name: Asst. Prof. Dr.
Abdul-Latif A. Al-Jumaily

Signature:
Name: Prof. Ayif Habeeb
Al-'Ani

In view of the available recommendation, I forward this dissertation for debate by the examining committee.

Signature:
Name: Dr. Saffa' Tariq Habeeb
Chairman of the Department of Educational and
Psychological Sciences.
Date: / / 2003

We certify that we have read the dissertation entitled "The Effect Of Using Certain Teaching Techniques On Overcoming Linguistic Difficulties Faced By Post – Graduate Students In Comprehending Scientific Texts" by **INTISAR IBRAHIM HASSAN AL-SAMARRAI,** and as an examining committee examined the student in its content and that, in our opinion, it is adequate as a dissertation for the degree of Doctor of Philosophy in Methods of Teaching English.

Approved by the Council of the College of education / Ibn Rushd

Signature:

Name: Dr. Abd Al-Ameer Abd Dixon

Dean of the College of Education / Ibn Rushd

Date: / / 2003

Dr. Abdul Amir Dixin

اثر استخدام أساليب تدريسية معينة للتغلب على الصعوبات اللغوية التي يواجهها طلبة الدراسات العليا في استيعاب النصوص العلمية

أطروحة مقدمة إلى مجلس كلية التربية (ابن رشد) في جامعة بغداد وهي جزء من متطلبات درجة دكتوراه فلسفة في طرائق تدريس اللغة الإنكليزية

من

انتصار إبراهيم حسن السامرائي

بأشراف

الأستاذ
عايف حبيب العاني

الأستاذ المساعد الدكتور
عبد اللطيف علوان الجميلي

١٤٢٤ هـ

٢٠٠٣ م

بسم الله الرحمن الرحيم

﴿ الرَّحْمَنُ ۞ عَلَّمَ الْقُرْآنَ

۞ خَلَقَ الْإِنسَانَ ۞ عَلَّمَهُ الْبَيَانَ ﴾

صدق الله العظيم

سورة الرحمن الآيات (١ – ٤)

1.1 Statement of the Problem and Significance of the Study:

The nature of scientific writing presents obstacles to many students. They find themselves in a new situation represented by the intensity with which the information is written, and the interrelationships of the concepts presented (Shepherd, 1973:214). This situation calls for a better understanding of the nature and characteristics of scientific writing.

Scientific writing is characterized by a quick succession of lots of facts that follow each other, and that usually demands both inductive and deductive mental activity. In order to understand how a particular principle is developed, the reader is required to recognize relevant information as well as to classify and order it. According to Thonis (1970:177), "science serves as an excellent vehicle for language as its content is drawn from the physical world with which pupils are generally familiar".

Language learners require English as a means of furthering their specialized education or as a means of performing a social working role as scientists, technologists, technicians, etc., efficiently (Mackay and Mountford, 1978:2). In the field of language learning (henceforth LL) the term "language for specific purposes" (henceforth ESP) has appeared frequently in the literature related to English language teaching (henceforth ELT). It is generally used to refer to the teaching of English for clearly utilitarian purposes (ibid). "It is a movement which, while remaining firmly within the ELT/Applied Linguistics discipline, has its own particular characteristics" (Dudley – Evans and St John, 2000:31).

Nonnative speakers of English need to read specialized English language material as part of their university course work. According to Cohen et al. (1988:152), ESP students become so frustrated in reading technical English that they seek native language summaries of English texts, or native language books even if they have mastery over the technical terms.

It is also recognized that students who have been able to master the fundamentals of addition, subtraction, multiplication and division are unable to do problems concerned with these fundamental processes. This is due to the problem of inability to read effectively in this particular subject (Staiger, 1973:53).

ESP courses are needed because it has been found that students, those of science in particular, studying at the university level face difficulties in comprehending their texts. These difficulties, according to LaBerge and Samuels (1977:217), "arise in understanding how words and clauses in a sentence are related to other sources of information". This also has been evident in examination results and through interviews made with the concerned students and teachers for such courses.

Thonis (1970:177) holds that, in scientific writing, students are confronted with specialized words of the various scientific fields as well as general vocabulary that ask for greater precision of meaning than ever before. Words signifying categories, classifications and expressions which help students compare and contrast events and objects are of great importance to comprehension.

One of the grave dangers in science reading is that the comprehension of information will remain at a literal and superficial level. As Staiger (1973:54) states, " the relationships between facts, their cumulative evidence, whether positive or negative, that gradually link up so that a principle may be obtained, demands the highest reading skill ". The accurate reading of diagrams and charts should help, not hinder this understanding.

Sclinker and Trimble (1974; as cited in Cohen et al., 1988:153) have found that technical vocabulary is not the only cause for students' difficulties in ESP. In fact, non-technical words in technical writing give rise to more difficulty than technical ones --- e.g., adverbial phrases, conjunctions, words used in anaphoric reference, and the structure of writing. They also found that

the use of articles and verb tense in ESP texts reflects the rhetorical or organizational decisions made by the author about the piece of prose (See also Yin, 1988: 102).

Students of science and technology who need to know the language in order to pursue their studies in higher education, face various types of difficulties in understanding what they read. These difficulties may be attributed mainly to the difficulties that are found in the foreign text. They can be classified into two categories: those related to content such as different types of sentences, their lengths and the types of modification, and those related to language such as types of English structure, tenses, types of function words and difficulties related to certain forms for certain functions as " language varies as its function varies" (Halliday et al., 1964:87). These difficulties will have a negative effect on understanding the meaning of the written text, and , consequently, students will lose the opportunity to achieve progress in learning their field of study. This is so because

> **Science reading is rarely light and rapid reading. On the contrary, it is usually very compressed and complicated material and must be sloughed through at a snail's pace which allows for reading, perhaps several times, before a clear grasp of a particular science principle is gained**
>
> (Thonis, 1970:92-f).

In most cases, such reading cannot be developed and mastered without the use of efficient teaching techniques.

In order to be taught adequately, reading should be considered a complex, intellectual task rather than a matter of the pronunciation of words. Developing mastery in reading comprehension (henceforth RC) calls for specific and systematic teaching that includes a wide variety of diverse activities (Staiger, 1973:11,48). In fact, teaching students to read effectively unaided would seem to be a powerful contribution to the main aim of

educators, i.e. to help students cope with self – directed, autonomous learning. If we can help students to read carefully and speedily on their own for their own purposes, then this will lead them to success (Urquhart and Weir, 1998:181). The significance of this problem stems from the fact that

> **English is established as the principal international language of science. Students all over the world are required to read textbooks and references in English, and success particularly in postgraduate programs has become dependent on the ability to read efficiently the appropriate literature in English.**
>
> (Al- Jubouri, 1979:123).

In spite of the fact that a number of studies have been conducted in Iraq to investigate the teaching of reading such as Al-Marsumi (1994), Al-Janaby (1998) and Ahmed (2001), no scientific research in the field of teaching EST reading has been carried out in Iraq up to the present, to the best of the researcher's knowledge. The present work hopes to redeem this deficiency by examining the effect of using certain teaching techniques on overcoming linguistic difficulties faced by post-graduate students in comprehending scientific texts. If proved efficient, these techniques as well as the other findings of this research will be of great value to all those involved in teaching EST from syllabus designers down to students.

1.2 Aims:

The present study aims at:

1- identifying and stating linguistic difficulties that hamper comprehension of the post – graduate students when studying their prescribed scientific texts.
2- investigating the teaching techniques currently employed in teaching EFL reading through surveying literature.

3- suggesting particular teaching techniques that help students overcome the linguistic difficulties (both structural and textual) identified above and applying them to a sample of post – graduate students.
4- investigating the efficiency of the recommended teaching techniques in improving achievement in reading comprehension through pre and post testing.

1.3 Hypothesis:

It is hypothesized that there will be no statistically significant difference between the mean scores of the students' achievement in RC before and after being exposed to the suggested teaching techniques.

1.4 Procedures:

The main procedures adopted to carry out the aims and verify the hypothesis of the study are as follows:-

1- Analyzing test papers of the post – graduate students to identify the linguistic difficulties they encounter.
2- Suggesting the use of certain teaching techniques to help students overcome these difficulties.
3- Constructing a pretest in the light of the error identified in (1) above in order to focus on the major sources of difficulty.
4- Conducting an experiment, initiated by the administration of the pretest, in which these suggested teaching techniques are put into application.
5- Re–applying the pretest (renamed posttest) in order to measure the progress, if any, the subjects of the experiment may have made.

1. 5 Limits:

The study is limited to postgraduate Diploma students studying at the University of Technology for the academic year 2001-2002.

1.6 Definition of basic terms:

The following are the working definitions of the basic terms involved in this research.

1.6.1 Reading is perception of written symbols as meaningful, involving recognition of words, fluency, comprehension, etc. (Page et al, 1980:284). It is "a complex cognitive process in which reader and text interact to (re) create meaningful discourse" Silberstein (1994:xii).

1.6.2 Comprehension is the act of understanding the meaning of printed or spoken language as contrasted with the ability to perceive and pronounce words without reference to their meaning (Good 1973:123).

1.6.3 Reading comprehension is the linguistic process of reconstructing the intended message of a text by translating its lexical and grammatical information into meaningful units that can be integrated with the reader's knowledge and cognitive structures (Harris and Hodges, 1982: 266).

1.6.4 Reading skills are the intellectual and perceptual abilities used in reading, including being able to recognize words, pronounce them, comprehend them, read them fluently, etc.(Page et al., 1980:285).

A reading skill is "a cognitive ability which a person is able to use when interacting with written texts." Reading skills are seen as part of the generalized reading process (Urquhart and Weir, 1998:88).

1.6.5 Teaching technique is an instructional procedure designed to relate to the learner the material being presented in order to facilitate learning (Good 1973:591).

1.6.6 English for special purposes refers to foreign languages studied by non – native speakers in order to carry out their studies or occupations (Page et al., 1980:201).

1.6.7 Text is any passage, spoken or written, of whatever length, that forms a unified whole. It is best thought of not as a grammatical unit but rather as a semantic unit, its unity being derived from a unity of meaning in context (Seaton, 1982:174).

1.6.8 Textbook is the basic book used in a particular course of study (ibid: 342).

1.6.9 Linguistic Difficulties are the structural problems that are the product of complex syntax, which often characterizes unsimplified English writing (Eskey, 1975:211). Linguistic difficulties in the present research extend to include, in addition to syntax, morphology, vocabulary, textual and rhetorical difficulties.

2.1 Introductory note:

This chapter presents a detailed description of the reading process dealing with its nature, levels, major skills, and the difficulties faced by the learners in comprehending their texts. Various theories, assumptions and opinions in this regard are surveyed and discussed. Emphasis will be put on the techniques used in teaching reading.

2.2 What is Reading?

Since reading is a complex intellectual task, many definitions have been suggested to clarify it. Concerning its essence, McKeown (1974:15) believes that "reading consists basically in deciphering a code". This means that the reader has to recognize the total shape of words and individual letters associating them with their sounds and interpreting them according to linguistic and extralinguistic factors. As for Strevens (1977:109), he considers reading as "making out the meaning of written language". Here there is a reference to the active role of the reader in discriminating the meaning(s) embedded in the text. According to Crystal (1997:211), reading "involves appreciating the sense of what is written: we read for meaning. It is this link-between graphology and semantics."

Reading is also defined as the act of creating meaning out of written symbols. It is a set of mental processes, founded on past experience, such as thinking, problem-solving, or reasoning, which involves analyzing, discriminating, judging, evaluating and synthesizing. In this context, reading materials must be scrutinized in the light of the reader's own experiences; therefore, interpretation and evaluation of meaning, as well as construction of meaning, should be included in any definition of the reading process (Jenkinson, 1973:45).

The working definition that is adopted in this study is Jenkinson's because it involves those aspects that are reflected in scientific thinking and that are mostly expected to be used by ESP learners.

2.3 The Nature of the Reading Process:

Harris (1969:1075) puts forward three views of the reading process. The first view pictures the process of reading as visual perception of words and their meanings. He reports Vernon's (1937) view that there are four components of word perception: "(1) a vaguely perceived form or contour, with (2) certain dominating or specific parts, which (3) stimulate auditory – kinesthetic imagery and which (4) arouse meaning."

The second view of the reading process, formulated by Thorndike (1917), is that "reading is essentially a process of meaning elaboration or thinking in relation to written symbols." According to this view, Harris (1948 in ibid.) has identified a general factor in comprehending literary materials plus the more specific operations such as 'translating', 'summarizing', 'inferring tone, mood, and intent' and 'relating technique and meaning.'

Coincident with the appearance of Bloom's Taxonomy of Educational Objectives (1956), Gray and Bogers (1956, as cited in ibid.) developed a scale to assess the maturity of reading processes in adults. They reported that mature readers to a much greater degree than immature readers engaged in processes of summarizing and organizing ideas in reading, of inferring meaning, conclusions and generalizations, of making evaluative judgments about what was read, and of applying ideas so generated.

It is clear that the focus in the above studies is on the cognitive processes. This is because reading is a complex task. Comprehension of written material depends on certain perceptual processes.

The third view of the reading process is introduced by Carroll (1964, as cited in ibid.) as the "perception and comprehension of written messages in a

manner paralleling that of the corresponding spoken messages." This means that Carroll views reading as two psychologically different processes. The first one is decoding from the written symbol, the grapheme, the appropriate phoneme or sound referent in the spoken language, while the second one is comprehending written message so decoded.

On his part Smith (1971:3-f) analyzes the reading process and makes distinction between word identification and comprehension. He holds that

> **reading to identify words and reading to obtain information are processes with similar aspects but quite different outcomes and that it is possible to read for comprehension without actually identifying individual words.**

It is obvious that Smith's idea of the reading process reflects a gestalt point of view in which the reader looks at the text as a whole not necessarily comprehending the meaning of each individual word.

Since Strevens (1977:109-f) sees reading as the process of making out the meaning of written language. He seems to view reading from four angles. The first is that reading is visual which means that it is carried out through the sense of sight. He asserts that effective reading requires the training of the muscles of the eyes to perform a number of tasks: to change focus as necessary; to seek a brief, large scale, general view of the text (skimming); to find a starting point, to change focus and scale so as to identify the language at the starting-point; and then to follow along the text altering direction as needed, and preceding at a speed which meets the understanding rate of the learner's brain.

The second angle is that reading is organized and systematic. This means that written language possesses beginnings and endings. The eyes follow a certain direction and know where to start and where to end. Written

language contains many internal breaks and divisions. The reader has to learn to be familiar with all the conventions of shape, sequence and arrangement.

The third angle is that reading is arbitrary and abstract but meaningful. The shapes of the symbols used in written language are arbitrary – they are unrelated to the real-life forms, just as the shape of the figure 5 is unrelated to the properties of the number 5. At the same time, written language embodies visual clues to information of three kinds: of a grammatical kind, a lexical kind, and a semantic kind; and in most writing systems the written language is a direct transform of the spoken language. Writing represents speech, not vice versa.

The fourth angle is that written language has great social and cultural importance. It reflects values and beliefs of people and their organized thought and it also performs the transmission of culture and ideas.

This point of view is thorough and comprehensive enough to encompass all the aspects of the reading process and shed light on its components on which teaching should be directed.

The most recent view of the reading process is reflected by Shaywitz (in D'Arcangelo, 1999: 26) who states that reading is not an instinctive human ability. Unlike speaking, there isn't a little reading center in the brain. The neurocircuitry is not set up to allow us to read. The brain system that lends itself to reading is the language system.

So, here, it is the role of the teacher to enrich the learners' competence with knowledge and improve the reading skills with techniques that help students get meaning from print by transcoding that print into language.

2.4 Reading Comprehension:

Reading, as has been argued before, is a complex skill that requires eye – movement, recognition of graphic forms associating them with their identified sounds and then the interpretation of what has been read

(Darwesh and Al-Jarah, 1987:47). The last component of the above definition is related to RC. Reading for comprehension is considered as the principal aim behind any reading. Chapman (1984:261) attributes the crucial role of the process of comprehending for both the teacher and the reader to the view that during this process, when individual readers are actively interpreting the text according to their knowledge and purpose, that learning is taking place. So, in this stage teachers can judiciously intervene for the betterment of the process.

LaBerge and Samuels (in Darwesh, 1999:25) describe comprehension as a private experience that gives the psycholinguist very little to measure. This comprehension is difficult to teach.

On his part, Widdowson (2000:63) considers comprehending as "the ability to recognize sentences manifested through the visual medium and to associate them with their correct signification".

In fact, according to Beck (1981:78f), RC is dependent on linguistic, conceptual, cognitive and general knowledge abilities plus decoding skills, i.e., the ability to make use of the above factors in giving meaning to what is read. Interpretation is also involved as Wallace (1997:340) points out that in recent studies of reading there has been a move from 'comprehension' to 'interpretation' because readers do not simply receive or extract meaning from texts; they construct interpretations.

2.4.1 Levels of RC

Before identifying and discussing the skills involved in comprehending written messages, it is important to define the levels that comprise these skills.

A famous classification of RC levels is done by Smith (1963: 286) who has categorized comprehension skills into four levels – the literal, the interpretative, the critical, and the creative.

1- *The literal level*: This is considered the simplest level in which all the student needs to do is to reproduce the facts as they are related by the author. At this level, the teacher can ask factual and detailed questions as a teaching technique.

e.g. State scientist x's point of view about dams that generate electricity.

2- *The interpretative level*: At this level the student is required to go beyond the information given by the author depending upon competence at the literal level. To develop students' competence at this level, the teacher can make a lot of class discussions and interpretations. He can also help them see how facts are interrelated to each other by using questions such as:

e.g. Why do you need to have exactly two grams of sodium for the experiment?

3- *The critical level*: This level depends upon the literal and the interpretative levels. At this level the student learns to evaluate and judge the information and the author's presentation of it. At this level students need help in making evaluation and judgement. So class discussion will be very useful.

e.g. What would the result of your experiment be if you used three grams of sodium sulfate?

4- *The creative level:* At this level the student is required to be involved with the information presented as he uses it to formulate or to rethink ideas of his own. One of the techniques to be used at this level might consist of

open – ended queries which require the student to include his own knowledge views and values.

e.g. What is the most crucial part of the experiment? Why?

It is noteworthy to say that this level is rarely utilized in comprehending scientific texts, and is mostly associated with literary texts; therefore, the researcher has put emphasis on the first three levels.

Another taxonomy, "*The Barrett taxonomy of cognitive and affective dimensions of reading comprehension,*" is reported by Clymer (1972:56-60) which involves the following levels:

1- *Literal comprehension* which focuses on the recognition and recall of ideas and information that are explicitly stated in the selection.

2- *Reorganization* which requires the student to analyze, synthesize, and/or organize ideas or information explicitly stated in the selection utilizing tasks of classifying, outlining, and summarizing.

3- *Inferential comprehension* in which the student uses the ideas and information explicitly stated in the selection, his intuition, and his personal experience as a basis for conjectures and hypotheses.

This dimension includes inferring supporting details, main ideas, sequence, comparisons, cause and effect relationships, character traits; predicting outcomes, and interpreting figurative language.

4- *Evaluation* which requires the student to make an evaluative judgment by comparing ideas presented in the selection with certain external and internal criteria. Such judgments may be of reality or fantasy, of fact or opinion, of adequacy and validity, of appropriateness, or of worth.

5- *Appreciation* which deals with the psychological and aesthetic impact of the selection on the reader, involving all the previously cited cognitive dimensions of reading.

It can be concluded that RC levels are sequential and developmental, i.e. each level is based on the level that precedes it and cannot be attained unless the previous one is fully mastered.

2.4.2 Skills of RC

Many skills are required for the comprehension of information. Some are quite simple while others are complex. These skills range from getting facts to drawing inferences, synthesizing ideas and evaluating what is read.

In the reading lesson, the aim of the teacher is to make students develop the reading skills in order to become effective independent readers. So the focus of interest in the reading lesson is neither language nor content, but the two together. The student must learn how language is used for conveying content.

In teaching reading, therefore, the teacher is to make clear what sort of skills are necessary and what methods are to be used to develop these skills.

In order to shed light on these skills, it is necessary to present the points of view of experts in reading. Staiger (1973:23) is of the opinion that the skills of reading are essentially the same all over the world. The reader will have to use essentially two skills. First he has to be able to identify graphic symbols by sight. Second he has to interpret the symbols which he has previously identified, deriving from them the message which they were meant to convey. For an experienced reader these two processes blend into one to such an extent that it is difficult both for him as well as for an outside observer to distinguish between them.

As a complementary to these skills, Rivers (1981:266) adds abilities to recognize structural clues. These include the indicators of word classes (or

part of speech) and of persons and tenses, phrase and clause markers and the particular modifications of meaning these indicate, the adverbs and adverbial expressions which limit the action in time, place and manner, etc. Nuttall (1987:31f) elaborates by suggesting skills and strategies of reading to be learnt through exploitation of texts. These are as follows:

(a) Skills involving flexibility of technique: variations in reading rate, skimming, scanning, study reading.

(b) Skills of utilizing information that is not, strictly speaking, part of the text itself: reference apparatus, graphic conventions, illustrations and diagrams.

(c) Word – attack skills: how to tackle unfamiliar lexical items by using structural clues – identifying what part of speech the word is, whether a noun, a verb, an adjective. Also lexical items can be tackled by morphological information – making students aware of affixes (see Appendix 1) or by inference from context in which the word occurs to give a rough idea of its meaning. Another method is by ignoring difficult words or using a dictionary.

(d) Text – attack skills: understanding a text involves understanding different kinds of meaning at the same time. Nuttall (ibid.:80 – 82) assures the existence of four levels of meaning:

1- Conceptual meaning: the meaning a word can have on its own.

2- Propositional meaning: the meaning a sentence can have on its own.

3- Contextual meaning: the meaning a sentence can have only when in context.

4- Pragmatic meaning: the meaning a sentence has only as part of the interaction between writer and reader.

The four kinds of meaning are of great help to the reader because each one supports the other. This means that every word in a sentence ties the

meaning of the sentence with the meaning of other parts of the text. These ties are the ties of cohesion (ibid., 83).

Text–attack skills include two sets of skills. The first set is signification and cohesion skills such as understanding sentence syntax, recognizing and interpreting cohesive devices, and interpreting discourse markers (see Appendix 2). The second set has to do with discourse skills such as recognizing functional value, tracing and interpreting rhetorical organization, recognizing the presuppositions underlying the text, recognizing implications and making inferences, and prediction (ibid.: 80 – 124).

Thonis, who is more concerned with the pedagogy of reading, holds the view that reading is a complex act requiring specific ability and certain skills (Thonis, 1970:67). She categorizes this act into levels starting with the 'pre – reading' level and ending with the level of 'purposeful reading'. Each skill in every phase of growth in reading becomes an essential building block which adds to the learner's strength and makes it possible for him to add new and more difficult skills. She adds that creating a successful reader depends upon the teacher's continuing appraisal of the pupils' progress in skill development and the careful adjustment of the reading programme.

After mastering the basic elementary reading skills such as word recognition skills and vocabulary building skills, the reader reaches a more advanced stage in which he uses other types of skills. Some of these skills which Thonis (ibid.: 77) focuses on in her treatment of RC are the readers' ability to:

a- infer meanings from context.
b- use pictures to gain meaning.
c- find other words which mean the same thing.
d- suggest words which mean the opposite.
e- recognize words which sound the same but which have different meanings.

f- use the dictionary and the glossary to improve their knowledge of word meanings.

g- know the meanings of the common affixes which will help unlock difficult words.

h- group words, phrases, parts of sentence to get thought units.

i- know the common connective words (conjunctions and prepositions).

The majority of the skills suggested by Thonis are concerned with the word and sentence levels. There is a need for treatment of the skills tapping the discourse level. Shepherd (1973:5) provides a more elaborate inventory of the reading skills. These are:

1- knowledge of word structure.

2- knowledge of meanings of words.

3- understanding how to get thought from various sentence patterns.

4- understanding functions of sentences in paragraph;

- recognizing logic of sentence arrangement.

- recognizing the main idea.

- recognizing paragraph types.

5- reading for details – note type and function.

6- seeing interrelationships of main ideas and details and of details to each other.

7- noting clue words indicating pattern of thought.

8- noting inferences.

9- anticipating outcomes.

10- noting and understanding styles of writing (figurative speech, metaphors, mood, etc.).

11- recognizing author's purpose, bias, type of structure.

To conclude, it is important to quote Norris (1975:202-f) who delineates five areas of skills. They are the following:

1- Speed of recognition and comprehension.

(a) Word – recognition speed: improving eye movement, visual discrimination.

(b) Word – comprehension speed: symbol – sound meaning association.

(c) Sentence – structure recognition: eye sweep, reading structures.

2- Vocabulary recognition and comprehension.

(a) Word formation: derivation and compounding.

(b) Lexical range: choices and restrictions.

(c) Vocabulary in context: using context clues to meaning.

3- Sentence structure and sentence comprehension.

(a) Sentence structures: understanding advanced – level conjunction, nominalization, embedding, etc. and grasping the "main idea".

(b) Sentence comprehension: understanding the full meaning.

4- Paragraph structure and paragraph comprehension.

(a) Paragraph organization: the "central idea" paragraph development.

(b) Scanning for specific information.

(c) Full understanding: paragraph analysis.

5- Comprehension of the complete selection.

(a)Surveying for the main idea.

(b)Scanning for specific information.

(c)Reading for full understanding.

An adequate understanding of the process of reading and the skills of comprehension involved in it is an important prerequisite for identifying the difficulties that impede proficient RC. These difficulties are the main concern of the following section.

2.4.3 Difficulties of RC

2.4.3.1 Features of Texts:

Before discussing the difficulties that students face in understanding texts, it is important to shed light on the features of a text that are known to give rise to difficulties for the reader. Nuttall (1987:83) cites the following features:

1- *Concepts:* Though it is argued that it is not the job of the language teachers to form concepts, it is their responsibility, especially those teaching language for specific purposes, to teach concepts and make them comprehensible.

2- *Vocabulary and sentence structure:* Having a good idea of a writer's message does not necessitate understanding the signification of every sentence. However, it is not possible in this case to be absolutely certain of it, nor to give the fullest response.

3- *Cohesive devices:* The use of pronoun reference, elliptical sentences and other cohesive devices causes further problems that concern the signification of sentences.

4- *Discourse markers:* Words such as *however*, *although*, *furthermore*, *namely*, represent a particular kind of cohesive devices which serve to mark the functional value of a sentence, i.e. they tell us what the writer intends by it.

2.4.3.2 Main Difficulties and Problems of RC

The learner who is not quite fully aware of the main features of texts will have problems in comprehending what he reads. A broad framework of general and specific types of reading problems might include, word

recognition, word meaning, comprehension, rates of reading, study skills and reading interests.

Shepherd (1973:82-98) summarizes the difficulties of RC in the following way:

1- The student may regard "word calling" as synonymous with reading. In this respect, students place emphasis upon recognizing the words and on reading fluently, neglecting the specific information contained in the words. The teacher is to develop in the students the habit of anticipating what the author will write. Readers should pay attention to headings within chapters which give a clue about the type of information which follows.

2- The student does not read for a well – defined purpose. In most cases, students read just because they are told to do so. They only get 'a fuzzy idea of what they are to learn'. A wise procedure is to lead students to evolve their own guide questions. They are to learn to apply the SQ3R (Survey, Question, Read, Recite, Review) study formula independently.

3- Students usually have difficulties with the complexity of sentences. Goodman (1970: 260) states that reading involves an interaction between thought and language. In this respect students must have an understanding of how language is structured in order to formulate ideas. Students only know various sentence patterns which they have used in oral communication. However, they may not be able to identify the parts of sentences nor know principles governing the function of the parts. Allen (1964:194-196) points out that a grammar is needed to help students recognize the sentence units in the more complicated sentences they meet in their reading. Ives (1964:222), following the same idea, concludes that grammar should be introduced as an aid to comprehension rather than as fragments of structural system. Widdowson (1998:52) states that the

morphological and syntactic processes can be described as operations of the code and that they function as devices for extending meanings.

Deighton (1964), as cited in Shepherd, (1973:94) argues that

> **the reader's structural problem is to determine the word groups and then to see how these groups relate to one another. Until he has done this distinguishing, he must hold the meaning of the sentence in abeyance.**

Accordingly, teachers need to help their students in the analysis of sentences with the view of attaining better comprehension in mind.

e.g. <u>A plane mirror</u> <u>is a mirror with a flat surface.</u>

subject predicate identifies the plane mirror

Deighton (in ibid.: 95) maintains that there are two types of sentences. One denotes action e.g. **"Light rays travel from you to the mirror"** and the other is attributive. e.g. **"An image is an apparent reproduction of an object."** He states that the verb is a form of <u>*be*</u> which is called a linking verb. He adds that the words following the verb refer to the words preceding it. This occurs with all linking verbs such as <u>*look*</u>, <u>*remain*</u>, <u>*stay*</u>, <u>*sound*</u>. The meaning in such sentences is that of identification, characterization or description.

In reading complicated sentences – compound, complex or long sentences which are both compound and complex, the student has a more involved job of understanding. He must understand the interrelationship of the parts of each clause as well as the interrelationship of the clauses to each other. He must pay attention to specific structure words called connectives such as: *although, and, because, but, for, if, however, so, thus, when, where, which, who,* and *yet*.

Here it is the job of the subject teacher to alert the students to the use of such structure words.

4- Another difficulty is that the student may not follow the author's organization: the student can employ different techniques to help himself in this respect, such as: the table of content of a textbook, the topical headings within a chapter, the chapter title, and think before reading about the type of information that will be included. Also the student should note structure words to discover how the author thinks and the interrelationships he wishes to give to ideas. (see Appendix 2)

5- The student encounters so many strange words that the passage means little to him. In such situation, the teacher can use many techniques such as using audio – visual aids, explaining the information included in the reading selection before the student reads, calling the student's attention to the graphic aids (pictures, tables, graphs and maps) and be sure that the student has a well – defined and specific purpose before he reads.

6- Ideas are introduced which are entirely outside the student's experience. The teacher may increase the background of the student so that the information and ideas will have meaning.

7- The student may fail to relate what he reads to the experiences which he has. Here prior to reading, the teacher can help the student recall his background information by previewing the material with him, by probing through questioning "e.g. What do you know about -----?" and also by relating similar experience. In probing, the student must have time to think. Immediate recall might not be expected.

8- The student may not distinguish the central idea from details: Students sometimes read all the factual data; but their understanding is only bits of information. Very little of the interrelationship of ideas is noted.

In this respect the student needs help in noting the organization and the paragraph structures.

In his attempt to provide students with practical aids to understanding by using paragraph clues, McCallister (1964:11-16) points out the importance of having the student learn to recognize different paragraph patterns, and the roles that paragraphs play as determined by their purpose, such as the central theme supported by details, introductory statements, paragraphs of definition, principle explained by illustration, comparison and contrast, cause and effect, problem solution, events in chronological order, and enumeration or summary paragraphs. Each kind of such paragraphs has its own characteristics and students are to be made aware of how to deal with each type.

The main idea behind presenting all the above – mentioned points of views is to identify what might be a source of difficulty for the reader and work out the teaching strategies required for helping our students to overcome these difficulties.

2.4.3.3 Identification of linguistic Difficulties via Error Analysis

Errors in learning are significant. There is some value in examining the kinds of errors learners frequently make and seeking plausible causes for such occurrence. This pursuit will include transfer from the mother tongue, learning strategies (e.g. When learners make incorrect generalizations about the target language), teaching techniques, and motivational factors. This will lead at least to a greater understanding of the difficulties that learners face and will perhaps assist in the development of pedagogic strategies (Wilkins, 1972: 206; and AL-Khataybeh, 1996: 38).

In conducting error analysis research, Corder (1974, as cited in Ellis, 1994:48-67) suggests the following steps:

1- Collection of a sample of learner language

The first step is to collect a massive, specific or incidental samples of language use from a large number of learners in order to compile a comprehensive list of errors representative of the entire population.

2- *Identification of errors*

Corder (1981:10) distinguishes errors of competence from mistakes in performance and argues that error analysis should investigate only errors. He proposes a procedure for identifying errors by reference to normal, authoritative and plausible interpretations.

3- Description of errors

Two types of descriptive taxonomies are used in this respect: linguistic and surface strategy. The former provides an indication of the number and proportion of errors in either different levels of language (i.e. lexis, morphology and syntax) or in specific grammatical categories (e.g. articles, prepositions, or word order). The latter classifies errors according to whether they involve omissions, additions, misinformations, or misorderings. Richards (1974:173), on the other hand, classifies errors in to two types: interlanguage errors, and intralingual and developmental errors.

4- Explanation of errors

Psycholinguistically speaking, competence errors can result from transfer, inter – and intralingual, or unique processes. They can also be induced through instruction. Error analysis studies have pointed out that the proportion of errors varies as a product of such factors as the learners' level,

the type of language sampled, the language level and the learners' ages. Also, errors can have more than one cause.

5- *Evaluation of errors*

Evaluation studies involve establishing the effect that different errors have on the person addressed – either in terms of comprehension or affective response (ibid.). They have produced evidence to show that global errors affect comprehension more than local errors, that non – native speakers are inclined to be harsher judges of errors than native speakers, and that different criteria involving intelligibility, acceptability and irritation are used to make judgements (Ellis 1994:69).

Error analysis and classification, according to Corder (1981) has been utilized in this piece of research in constructing techniques for dealing with errors after they have occurred. Moreover, a major part of the pre-post test of the present study is based on the results of this process (as shown in 4.5.2.1 below).

2.5 Teaching Techniques

The major art of teaching RC lies in the ability of the teacher to direct and control simultaneously several activities on the part of the students. He has to check the accuracy of what is read, to probe the students' ability to assimilate and interpret not only the superficial meaning but other higher levels of meaning, and to ensure that by participating in concepts and ideas presented by the author (Staiger, 1973:48). In doing this, the teacher should consider using any medium that stimulates students' interests and involvement in language (Holloway, 1999:81).

The teacher's overall concept of reading and the nature of the reading process strongly affects his methods of diagnosing reading difficulties and of teaching reading. If he thinks of reading as a visual task, according to Strang's

(1972:72) point of view, his main concern will be the correction of visual defects. If reading to him is word recognition, he can provide drills on the basic sight vocabulary and word recognition skills. If he considers reading as a mere reproduction of what the author says, he will direct his students' attention to, and check their comprehension of, the literal meaning of the passage.

Then, Strang (ibid.) focuses on the positive side of the picture. In other words, if the teacher views reading as a thinking process, he will seek to improve the reader's skill in making interpretations and generalizations, in drawing inferences and conclusions. And if he believes that reading contributes to personal development and social welfare, he will select for his students the reading material that will help them develop sound values and that will have some applications to their lives and to the modern world.

It is true that the student must develop his own skills of reading, but it is important for such development of mastery of productive reading habits in a foreign language according to Kobayashi (1975:190-f), to be conscious and governed by thorough, deliberate and systematic instruction that includes a wide variety of diverse activities that are offered within the framework of a well – integrated programme – if any measure of success is to be achieved. In this regard, Staiger (1973:48) stresses the importance of mastering each face of comprehension before proceeding to another related aspect. To achieve this the teacher needs to concentrate on one skill for several lessons until the students have developed facility in utilizing this skill in connection with all types of material. For example, literal meaning should be firmly grasped before any attempt is made to teach the student how to make inferences or draw conclusions.

The method used to teach reading is often inherent in the materials available. Teachers can enrich the official methods by their individual experience, so that the individual needs of learners can be met. This includes

giving learners techniques for approaching texts of various kinds to be read for various purposes. Staiger (ibid.: 19) cites some of the ways in which the teacher adjusts to the textual structures of limited materials such as additional practice materials beyond those included in the textbook, the personalization of a situation in a text, or the expansion or contraction of a lesson. Rivers (1988 : 130) adds that control in language use of these aspects comes through frequent communicative interaction in activities and interludes that have significance for the learner and in which meaning is successfully apprehended and conveyed.

In the field of teaching reading there is a kind of controversy concerning the adoption of a specific method or an eclectic one. Moyle (1973:108,113) maintains that many teachers believe implicitly in one particular approach in spite of substantial evidence derived from research and observation that no one method of teaching the early reading skills is superior. In fact, theoretical description of an approach hardly corresponds exactly to the actual manifestation of that approach in the classroom. However, teachers tend to employ a 'mixed methods' approach using elements drawn from more than one approach, whatever media or materials form the basis of their reading programme.

2.5.1 The Art of Questioning:

Questions in teaching are devices for getting the students' attention and they always remain among the teacher's basic techniques.

According to Jenkinson (1973:49-f), the most effective way of stimulating learners is by posing provocative questions about reading content. These questions should not be of simple recognition and recall, but questions that demand higher levels of cognitive activities, i.e. questions that demand interpretation, judgment and critical thinking, that frame purposes of reading or that demand information to be verified from the text. Such questions are

most common and essential. The types of questions that seek to extend and raise the level of complexity of the reader's reaction, those which insure that understanding of printed material will develop and mature are also helpful and essential.

The teacher may need to select for teaching purposes those questions which give practice in a certain skill. He may also provide his students with certain exercises that emphasis certain skills and thus promote reading and understanding; the results will be much better if emphasis is put each time on one certain skill only. Fry (1972:185f) refers also to the importance and usefulness of class discussion of the questions in the teaching of RC.

Carver (1978:293) suggests certain types of questions that the teacher can make use of such as:-

a- Factual questions – concerned with what is clearly said in the passage.

b- Interpretation questions – concerned with what is not clearly said, but which is meant to be understood.

c- Textual questions – concerned with finding the part of the text and the actual expressions in which the author says what he does say.

d- Logical questions – concerned with seeing the connection between sentences in different parts of the passage.

e- Inference questions – concerned with what is not in the passage which is similar or contrasts with situations from the pupil's own experience or knowledge.

f- Judgment questions – concerned with the pupils' own opinion of what they have read and discussed.

It is necessary to note here that students must not be overtaxed with complicated grammatical questions that block the understanding of the passage. The kind of questions to be asked must help the student think about the ideas presented in the passage and make the necessary connections in order to gain full understanding.

2.5.2 Suggested Techniques for Reading Skills

In his remedial reading course Kobayashi (1975:190-f) devises teaching techniques that put concentrated emphasis on the following skills: -

1- Determining the main idea, which is not always an easy task especially if the reading selection is a complex and lengthy one. The selections to be used for this part of the exercise should be no longer than a short paragraph between 200 and 250 words and should be written in such a way that the student cannot fail to locate the main idea.

2- Relating supporting details to the main idea: If the student has mastered the previous exercise, which is determining the main idea, he should not find it difficult to expand his attention to a wider range without losing sight of the main point .

3- Using contextual clues to arrive at word meaning: The student is to be given exercises which will develop his ability to perceive the meaning of words not in isolation but in their relation to the whole. We may, for example, ask the student to deduce the meanings of low – frequency words that we have strategically placed in a context designed to limit and suggest those meanings. In another type of exercise a student may be given a sentence with a word missing and asked to supply the right word to make sense according to the meaning of the context. [See Appendix 3]

4- Adjusting reading to purpose: For developing healthy reading habits the reader has to realize that reading should always have a specific purpose and that he must in each case adjust his manner of reading to that purpose.

To accomplish this, the student may be given questions prior to the reading and asked to locate the information which will answer such questions.

It is an effective device for directing and holding the student's attention to the content. The student will be taught to skim the irrelevant parts to his present task and read intensively the crucial part.

In the final stage, it is preferable to give the student a longer text to read in a given time requesting him to follow the development of the writer's main ideas, relating ideas presented in separate paragraphs while skipping details that are of no immediate importance. This is exactly the type of reading we want the student to be able to do in any situation.

Thus the teacher can play his essential role as a catalyst between student and author to help the students bring fuller and clearer meaning from the reading experience. He can best fulfil his role as Kobayashi (ibid.:194-f) suggests by using the following techniques:

a- Going from the general to the specific: It is important for the teacher to treat the selection in its entirety before getting down to particulars; accordingly, he should have the student read the whole selection before coming to class. If the selection is too long it should be divided into meaningful units for separate assignment.

b- Structuring the reading: The student is an inexperienced reader, he does not yet know how to structure his reading. The teacher can help him by preparing general questions to go with the reading assignment. He can thus lead him into the habit of asking himself the kinds of questions that will help him get a clearer sense of the content of his reading.

c- Asking general questions:- the teacher can fruitfully devote the first session on discussion of general questions.

e.g. What would you say if you were to describe the experiment of ----
or What are some of the characteristics of --------

Then the teacher may ask the class what particular significance the episode has in relation to the text and gradually lead them up to the question- :

What is it that the author wants to convey to his reader through the text?

d- Asking questions about details:- after finishing the general introductory questions, the teacher can work with the details that bring substance to the framework just constructed.

e.g. Which statement most vividly describes the––––––––––

e- Resolving mechanical problems:- if the process of questioning reveals the student's inadequate understanding of a passage, the teacher should work on the passage more closely to solve "mechanical" trouble. A solution of "mechanical trouble" which thus sheds light on a passage crucial to an understanding of the whole selection has a good chance of becoming part of the student's living knowledge.

The teacher may also set aside time for the students to ask him questions. Such questions may shed light on some vague points to be made clear and easy to understand.

f- Resolving problems of cultural interference: The reading course should promote the student's cultural understanding as he progresses in linguistic competence. A student will not have a mature understanding of a work until he has attained not only linguistic competence but also cultural insights. At an advanced level, the student should be introduced to an increasing number of works which provide cultural information.

Most of the techniques advocated by Kobayashi have found their way in the suggested teaching techniques in this research supplemented with ample exercises that give students good practice in mastering efficient reading skills. (see Appendix 3).

On her part, Sonka (1979:2-5) suggests techniques for teaching comprehension of general ideas and specific facts focusing on paragraphs and topic sentences. These techniques include:

1- Asking the students to number the paragraphs of the article they will be studying that day. This will call their attention to the fact that articles are

written in discrete paragraphs and that they will be concerned with understanding paragraphs, not individual words or sentences.

2- Asking students to underline the first sentence of each paragraph. In eighty or ninety percent of nonfiction writing, the topic sentence of a paragraph is the first sentence. As the class reads each of these underlined sentences, the teacher elicits from them what they think the paragraph will be about. These guesses are recorded and later confirmed, when the entire article has been studied. Anticipation facilitates both reading efficiency and comprehension.

3- Providing a list of general topics which the student has to match to the correct paragraph of the reading. In this case the idea that each paragraph is centered around one topic becomes clear.

4- Giving the student a list of facts which he has to match to the general topics without referring to the original. Also, he may indicate the paragraph in which he thinks he will find each fact.

5- Involving students in outlining activities that fall naturally into the area of general topics and specific facts. Here, the students are given a skeleton outline with all the general topics filled in one section, and asked to supply the specific facts in their appropriate places.

The first four techniques have been utilized in the teaching techniques in this research, with concentration on the use of cohesive devices and clause markers that are essential in identifying the general topics and specific details.

In this respect, students should be given practice in quick recognition of structural clues. It is important for them, according to Rivers (1981:276-f), to develop the art of distinguishing indicators of tense, affirmation, negation,

question, and exclamation; words which modify the meanings of other words; relationships of time and cause and effect; and conditional statements. During reading practice, the teacher can give incidental training in recognition grammar as problems arise in the text, emphasizing those aspects which can lead to misinterpretation or ambiguity for the reader (see also Allen and Valette, 1977:258).

In other words, "activities needed to be devised which would require learners to access grammatical knowledge for some purpose, other than practice" (Widdowson, 1999:166). This purpose, in fact, is better understanding and deeper comprehension of the text under study.

3.1 Introductory note:

This chapter is devoted to the treatment of reading in ESP. Before any endeavour to approach the aspects of ESP and its relevance to language teaching and learning, it is important to probe deeply into the nature of ESP, its classification and its various definitions. The major phases of ESP development and its main features are surveyed in this chapter. The relationship of ESP to theories of LL, as well as the role of ESP teacher, are introduced. Finally, the reading skills in ESP and the suitable techniques for teaching them are discussed.

3.2 What is ESP?

ESP is one of the apparent developments in the methodology of English teaching in the 1960s. It represented an increased concern with the problems of learners in further and higher education who need to know the language to pursue their specialist studies, especially in the fields of science and technology (Widdowson, 1979:37).

ESP stands in contrast to "general English". "General English" is oriented towards the common or garden variety of learners of English, while ESP is oriented towards the needs of a specific group of people specialized in a certain field of knowledge. "It is distinguished from other approaches to the teaching of English in the choice of vocabulary, grammar, rhetoric, situations and types of activities" (Al-Hamash, 1977:2).

Wilkins (1976:73) holds that learners' needs in special purpose language courses are met with a restricted kind of language in which the vocabulary has a rather specialized character and the grammar is either limited in its range or has unusual distribution.

As for Strevens (1977:90), he uses the term ESP to refer to those courses in which the aims and the content are determined "not by criteria

of general education … but by functional and practical English language requirements of the learner".

The concept of ESP is seen by Hutchinson and Waters (1987:19) as an approach rather than a product. They define ESP as an approach to language teaching which is based on learners' needs and in which all decisions as to content and method are directed by specific and apparent reasons for learning.

Robinson (1991:3) accepts the primacy of needs analysis in defining ESP on the basis of two key defining criteria and a number of characteristics. Her key criteria are that ESP is 'normally goal – directed', and that ESP courses develop from a need analysis that aims to specify what students have exactly to do through the medium of English. Her characteristics are that ESP courses are constrained by a limited time period, and are taught to adults in homogenous classes.

A more recent comprehensive definition of ESP is introduced by Dudley Evans and St John (2000:4), involving a set of absolute and variable characteristics. Three absolute characteristics are identified: designing ESP to meet specific learner needs, making use of the underlying methodology and activities of the disciplines it serves, and centering on the language skills, discourse and genres appropriate to these activities. Variable characteristics include that ESP may be related to specific disciplines, may use a different methodology from that of general English, is likely to be designed for intermediate or adult learners, and assumes basic knowledge of the language system.

An important point should be made here. The emphasis of the word 'special' in the term 'English for Special Purposes' should be firmly placed on the purpose of the learner for learning the language, not on the language he is learning. In other words, ESP implies a special aim that determines the precise area of language required, skills needed and the range of language functions to be covered. Mackay and Mountford

(1978:4-6) understand the notion of special language just as a restricted repertoire of words and expressions selected from the whole language because it covers every requirement within a well – defined context, task or vocation. This notion sees ESP, wrongly according to this piece of research, as involving the teaching of vocabulary, or to say the most, as fully semantically and pragmatically oriented. In this work, ESP is taken to involve essential aspects of grammar that enable the learner to use the inventory of lexical items in good English, not, as is generally well – known, using technical words stuck together, words borrowed from the learner's native language.

3.3 Classification of ESP

ESP has traditionally been divided into two main areas: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP). These two areas are subdivided according to discipline or professional area, as shown in Figure 1 below. In EAP, English for Science and Technology (EST) has been the main area (Dudley – Evans and St – John, 2000:6).

3.3.1 English for Science and Technology (EST):

The emergence of EST as an important aspect of ESP programmes came out of the demand for ESP from scientists and technologists who need to learn English for a number of purposes connected with their specialism. Hence, the term EST "presupposes a stock of vocabulary items, grammatical forms and functions which are common to the study of science and technology" (Kennedy and Bolitho, 1984:6).

Another definition of EST is introduced by Strevens (1977:90) in which he stresses the distinct nature of EST courses since they require the incorporation of a greater content of 'scientific English'. He maintains that this in turn entails "the learning of ways in which quantification of various kinds is expressed in English, the control of the 'international' vocabulary of scientific stems and affixes as they operate in English, and selection of communicative purpose special to science and technology"

As the figure above illustrates, English for medical purposes is a hyponym of both EAP and EOP. It is worth noting that English under each of these super-ordinate terms is geared towards a different audience. While under EAP it serves the needs of prospective higher medical staff, doctors, surgeons, dentists, etc., under EOP it is oriented towards the job needs of middle and lower staffs such as medical assistants, nurses, and so on.

3.4 Development of ESP

Since language is devised to express different aspects of the society, the number of special purposes to which language can be put is bound by the number of the facets that the society develops.

In the first place, it is important not to regard ESP as an area of development separate from the rest of ELT. It is part of the recent move within the ELT sphere towards a more communicative basis for teaching and learning (Kennedy and Bolitho, 1984:7).

From its early beginnings in the 1960s ESP has undergone five main phases of development. ESP has developed at different speeds in different countries.

It will be noticeable in the following overview that EST is one activity that has been particularly important in the development of ESP. Swales (1985, as cited in Hutchinson and Waters, 1987:9) uses the development of EST to illustrate the development of ESP in general, stating that EST "has always set and continues to set the trend in theoretical discussion, in ways of analyzing language, and in the variety of actual teaching materials."

As reported by Hutchinson and Waters (1987:9-14) and Dudley – Evans and St John (2000:21-27), the main phases or trends in the development of ESP are as outlined in the following sub – sections.

3.4.1 Special language: Register analysis

This stage took place mainly in the 1960s and early 1970s and was associated in particular within the work of Peter Strevens and Jack Ewer. Operating on the basic principle that the English of, say, electrical engineering constituted a specific register different from that of, say, biology or of general English. The aim of the analysis was to identify the grammatical and lexical features of these registers and to produce a syllabus which gave high priority to the language forms students would meet in their science studies.

3.4.2 Beyond the sentence: rhetorical and discourse analysis:

After the focus on language at the sentence level, the second phase of ESP development shifted attention to the level above the sentence as ESP became involved with the emerging field of discourse or rhetorical analysis. The basic hypothesis of this stage, as expressed by Allen & Widdowson (1974), is that

> **the difficulties which the students encounter arise not so much from a defective knowledge of the system of English, but from an unfamiliarity with English use, and that consequently their needs cannot be met by a course which simply provides further practice in the composition of sentences but only by one which develops a knowledge of how sentences are used in the performance of different communicative acts"**
>
> (Hutchinson and Waters, 1987:10-f).

It can be concluded that understanding how sentences are combined in discourse to produce meaning helps the students select the linguistic forms that suit certain functions and situations.

3.4.3 Target situation analysis

The major purpose of an ESP course is to enable learners to function adequately in a target situation; that is, a real – life situation in which the learners will use the language they are learning. The ESP course designer should carry out a process of needs analysis in which he identifies the target situation and its linguistic features. The identified features will form the syllabus of the ESP course.

The most thorough exemplification of the Target Situation Analysis is Munby's (1978) model in which he produces a detailed profile of the learners' needs in terms of communication purposes.

3.4.4 Skills and strategies

There has been a shift of emphasis from the analysis of the surface forms of the language (whether at sentence level, as in register analysis, or above, as in discourse analysis) to the analysis of the thinking processes that underlie language use. The skills – centered approach is based on the assumption that underlying all language use there are common reasoning and interpreting processes which enable us to extract meaning from discourse. In other words, the emphasis in this approach is on the underlying interpretive strategies, which enable the learner to cope with the surface forms, for example guessing the meaning of words from context, using visual layout to determine the type of text, exploiting cognates (i.e. words which are similar in the mother tongue and the target language).

In this perspective, and in line with the cognitive learning theories, the language learners are treated as thinking beings who can be asked to observe and verbalise the interpretive processes they employ in language use.

3.4.5 A learning – centered approach :

This stage of ESP development has emerged as a reaction to the four stages, outlined so far, which have been criticized for being based on descriptions of language use, whether of surface forms or underlying processes. It is held that the main concern in ESP is not with language use, i.e. what people do with the language, but with LL. A truly valid approach to ESP must be based on an understanding of the processes of LL.

It can be concluded that ESP has generally been concerned with procedures and practical outcomes. Its development has been associated with, and affected by, the developments in ELT, moving from grammatical, functional and notional syllabuses to a more eclectic and task – based approach.

There is currently no dominating movement in ESP, as Dudley – Evans and St John (2000:30-32) hold. In fact, there is now acceptance of many different approaches, coinciding with the growing diversity in ESP teaching, and a willingness to mix different types of materials and methodologies due to the constraints of the different situations involved in ESP. However, ESP still needs to be sensitive to movements in ELT and applied linguistics, such as the World Englishes movement and analysis of different national styles of rhetoric.

3.5 Features of ESP and Relevant Difficulties:

The concept of ESP is not a mere classification of the lexical items specific to a particular discipline of knowledge; it presupposes that both the sentence level elements and other discourse elements are specific as well. An integration of the grammatical and the communication properties of language in specific situations is essential to a proper teaching of ESP (Bhatia, 1979:26).

However, the impression that ESP is a language variety in itself with specific rules governing its usage is not true. According to Widdowson (1974, in ibid.) literary and scientific English are not assumed to be different forms of English; rather they are two different ways of using the same language. Both are kinds of communication, not different in terms of lexis or syntax, though each might employ certain syntax or lexical features more frequently than the other does to express certain communicative functions. Indeed it is in terms of their communication function that one can best understand how they differ and how they are alike. The methodology of science, with its demand for objectivity, systematic investigation and exact measurement, entails several linguistic features. A theoretical framework of EST includes a description of the underlying processes in scientific writing such as definition, classification and analysis. There is also an overriding concern for impersonal statement, logical exposition and precise description. (Bhatia, 1979 :26, and Crystal, 1997:384).

Scientific English can be further analyzed in terms of descriptive writing, function writing, and process writing. Emotional comment, humour, figurative expression, affective utterances and other aspects of personal language are avoided. The mathematical expression of relationships promotes an extensive and frequent use of numerals, operators, letters and other special symbols (as formulae, equations, etc.) (Crystal, 1997:384). In summary, ”scientific language centers on a perception of logical relationships and their representation in abstract models” (Bhatia, 1979:26).

Nevertheless, these very features of ESP imply certain difficulties that represent problematic areas for nonnative speakers of English. Eskey (1975:211), for instance, specifies three major kinds of problems for advanced readers:

1- vocabulary problems,
2- content (especially cultural) problems, and
3- structural problems.

Since these difficulties interfere with the comprehension of scientific English texts, it is necessary to pay some attention to them.

From a linguistic perspective the main features of EST can be classified as illustrated in the following subsections. The instructor should be fully aware of these features and of the difficulties arising from them so as to be able to draw his students' attention to them and enrich their competence to facilitate their comprehension of scientific texts.

3.5.1 Linguistic Features

3.5.1.1 Features at the sentence level:

3.5.1.1.1 Syntactic Features

The grammar of scientific language contains several distinctive features. Sentences are often long and have a complex internal structure. The complexity is mainly centered on the noun phrases rather than the verb phrases (Strevens 1977:93 and Crystal, 1997:384). Regarding verb and tense, the present simple, active and passive voice and the modal verbs are mostly used.

Eskey (1975:211) considers structural problems an area of difficulty that has received the least attention. These problems, he adds, are a product of the complex syntax that so often characterizes unsimplified English. Many students ascribe their inability to understand a passage to their ignorance of the meaning of words. However, they may neglect the fact that this may be attributed to the difficulty they face in understanding the structures of sentences (see also Nyns, 1988:256).

When learners read scientific texts, their grammatical weakness can interfere with comprehension of meaning. Hence, the relationship

between meaning and from can be taught or revised in context through analysis and explanation.

In general, the major syntactic features of EST include:

1- **Passivization**

Although the idea that scientific writing uses the passive voice more frequently than active is doubtful, what is true is that such writing tends to use the passive construction more frequently than some other types of writing. So we find that " scientific texts generally place the emphasis on what happens to things instead of on the person who performs the action. Therefore they frequently use the passive voice " (Dresdner, 1975: 244) .

The choice of active or passive is constrained by functional considerations; writers tend to use the **we** – form active when they describe their own procedural choices. The passive is used when standard procedures are being described (Dudley Evans and St John, 2000:76).

2- **Choice of tense**

Scientific writing does not restrict itself to certain tenses. However, the tense that seems to be of common occurrence is the simple present tense. This is true because scientific writing deals mostly with descriptions, definitions, exemplification, statements of cause and effect, generalizations, etc. The use of the present perfect tense is also recommended in academic writing. (Al-Jubouri, 1979:127).

3- Modals

Modal auxiliary verbs, especially *may*, *might*, *could*, *would*, have many uses in technical writing. Three in particular stand out: (1) they can give extra precision to the observations, claims, recommendations, and other kinds of statements that technical professionals are frequently required to make, (2) used properly, they can add an extra degree of

politeness to interpersonal communication, and (3) they are used to indicate the degree of certainty of a writer's commitment to a statement or claim (Huckin and Olsen, 1991:69). For example, if the writer says, 'the discrepancy in the results may be due to incorrect calibration of the instrument' s/he is making a cautious statement. If, however, s/he states 'the discrepancy in the results could be due to incorrect calibration of the instruments,' the statement is even more cautious. The writer is distancing him/herself from the statement rather more with *could* than with *may*. This phenomenon is generally referred to as *hedging*. There are many other means of expressing hedging, for example the use of a reporting verb such as *suggest*, *appear to*, *seem to*, *tend to* in order to distance the writer from the statement that s/he is reporting (Dudley Evans and St John, 2000:76).

4-Noun modification:

Noun modification in scientific writing is considered an important syntactic feature. Many devices are used for modification such as:

a- noun compounding which is very important to technical discourse. New terms are constantly needed for the new concepts and objects that technical fields often create. Noun compounding is the single most efficient, productive, and commonly used way to create such terms. So, technical students should be encouraged and taught to use them most effectively (Huckin and Olsen, 1991:73). **e.g. air – compressor**

b- adjective **e.g. hot water**

c- present participle **e.g. lubricating oil**

d- past participle **e.g. compressed air**

e- noun (or adjective) + noun + ed construction **e.g. a flat-bottomed roller**

f- adverb + past participle construction **e.g. an easily corrected material**

g- relative clauses **e.g. Loads which tend to pull a body apart are heavy**

5-Relativisation:

One of the distinctive and essential structures in scientific writing is the use of relative clauses. These clauses allow the user to qualify noun phrases and thus make their meaning more precise. The need for this structure arises from the tendency in scientific uses to define or describe the shape, properties, structure, location, function or process of certain objects (Al-Jubouri,1979:132; and Hucken and Olsen, 1991:70).

It is not uncommon in scientific texts for a whole string of modifiers to precede a noun,

e.g. Improvement was achieved by crossing the old wheat with other high – yielding and lodging – resistant varieties.

the difficulty is further aggravated when the student does not distinguish readily between the functions of adverbs and adjectives,

e.g. (a) an extensive heat – affected zone.

(b) an extensively heat – affected zone.

In sentence (a) the zone which is affected by heat is large, whereas in (b) the area itself is greatly affected by heat. In (a) extensive is an adjective modifying zone.

Relative clauses can be divided according to:

a) Function: Relative clauses can be one of two types: defining (restrictive), i.e. they define or describe the noun (antecedent), or non–defining (non – restrictive), i.e., they add some more information about the antecedent, which is already known to both the writer and the reader. Most relative clauses used in ESP are of the “restrictive”

variety, occurring without commas and serving to narrow down the possible referents of the noun phrase.

1- defining relative clause

e.g. Loads which tend to pull to a body a part cause lensile stresses.

2- non – defining relative clause

e.g. Brass, which is an alloy of copper and zinc, is used to make bolts and screws. (brass is already known to be an alloy).

b) Form: According to form, relative clauses are either full – form relative clauses or short – form relative clauses,

e.g. The mill which produces sheet steel was made in scotland. (full form)

Short – form relatives are constructed as follows:

1/ by omitting *which* and changing the verb to its – ing form.

e.g. The steel beams forming the chassis of the truck are welded together.

2/ by omitting *which* + *verb to be* in the cases of passive verbs. This can be carried out whether the clause is defining or non – defining.

e.g. The heat required for welding is produced by an electric arc.

3/ by introducing the relative clause with the preposition *with* to give the meaning of which + have.

e.g. Two steel sheets with a thickness of 3 mm each are joined by rivets.

(ibid:132-136)

In fact, complex sentences constitute a stumbling – block to the student untrained to grapple with them. Practice in sentence analysis can help a student discern the grammatical pattern and unravel the meaning of the sentence.

6-Articles:

The use of articles is one of the problematic aspects of grammar for foreign language learners. Certain uses of articles are of particular importance in ESP. These are the absence of an article (Ø article) in general statements with an uncountable noun, as in:

Copper is a reddish metal.

and the use of 'the' with named methods, procedures, formulae, graphs, cycles and other concepts as in:

the Smith hypothesis, the water cycle, the Fry model.

These two aspects of article usage can be taught by making the rules of usage specific. Concentration on a limited number of uses that can be easily explained is usually more effective (Dudley -Evans and St John, 2000:77). Concerning the definite article, students should be made aware that it has a number of important uses, such as: (1) it helps maintain coherence in a text by clarifying references, (2) it helps make meaning more precise, and (3) it helps create a natural English rhythm to the flow of words. All of these things promote comprehension of both spoken and written English (Huckin and Olsen, 1991: 64).

7-Nominalisation:

The abstract language favoured by academic writers is characterized by nominalisation, i.e., the use of verbal nouns usually ending in suffixes such as – ation, - ition, - ment or – ness (Mason, 1990, as cited in ibid.). Such use enables complex information to be packaged into a phrase that is simple from a grammatical point of view and that can be picked up in the theme.

e.g. A high primary *productivity* is almost invariably related to a high crop yield. High productivity can be achieved by ensuring …

The nominalised phrase which acts as the grammatical subject in the first sentence is also the grammatical subject of the second sentence (Dudley – Evans and St John, 2000:77f).

8-The Final V – ing clause

This is one of the structures that technical writers frequently use in their writing. Herbert (1965, as cited in Al – Jubouri, 1979:137), gives uses for this clause

a/ in place of *and*:

e.g. The starter motor is switched off, the engine accelerating under its own power.

b/ in place of *since*

e.g. The proton is opposite of the electron, being a particle of positive electricity.

c/ to show result:

e.g. The rivet contracts as it cools, drawing the plates together.

9- Conditionals:

The simple conditional is another syntactic structure recurrent in EST. Its function manifests two principal uses:

a/ to make general statements

e.g. If a figure is square, it has four sides.

b/ to illustrate rather abstract propositions :

e.g. Speed is the ratio of the distance travelled by a moving body to the time taken. For instance, if a lorry travells 200km in 4hrs, it has an average speed of 50 kph. (ibid:138)

What is noticeable about conditionals in this respect is that the type most commonly used in this genre is the factual type in which both verbs, main and subordinate, are in the simple present tense. This, of course, eases the burden on behalf of both the teacher and the learner since they need not get entangled with the thorny area of real and unreal condition, a subject which has proved extremely difficult for Iraqi learners to master especially at the production level.

10-Time statements

Time statements with the use of expressions such as *after*, *when*, *before*, *until*, *till*, are used to describe sequence of actions, processes, cause and effect, and generalizations.

e.g. After the air leaves the compressor, it enters the combustion chamber.
(ibid :138f)

11- Negation:

Although the use of double or even triple negatives is common in English and is not a specific feature of ESP, it can cause enormous difficulty to ESP text readers. Sentences like "It is by no means certain that…", and "It is unusual to meet with a non – irrefutable claim…" cause endless confusion, and when coupled with inversion, such as "Rarely does it seem that …" the difficulties will aggravate. To add to this difficulty, the negative prefixes and suffixes are sometimes used not to denote negative but a 'greater measure of'. *Inflammable, invaluable, priceless* are examples. The student will require considerable practice in overcoming these difficulties.

3.5.1.1.2 Lexical Features

Scientific language illustrates several important features of vocabulary and grammar. The large technical vocabulary is undoubtedly

its most characteristic feature, reflecting the specialized subject matter of scientific domains.

Everyday words are too vague for many scientific purposes, so new ones have to be invented. Moreover, scientific vocabulary requires continual updating in the light of the process of discovery. Science is in fact the main birthplace for new words in a language.

Concerning terminology, it should be noted that scientific texts are replete with scientific terminology; jargon, and idioms. The student must acquire the habit of using a technical dictionary in addition to a general dictionary.

"The categorization of lexical items such as nouns, verbs, adjectives and prepositions in EST has been carried on grammatical bases rather than on semantic analysis" (Al-Jubouri, 1979:139). The reason might be that scientific lexical items are hard to isolate and a definition is not easy to construct.

1- **Verbs:**

Swales (1976, as cited in ibid.), working on verb frequencies in scientific English, gives a table of verbs and their frequencies:-

e.g. be , have, find, show, call, give, use, make, produce, form, know, contain … Verbs such as produce, develop, and grow describe natural processes and are among the high frequency words in biology.

Swales comes out with two features of the common verbs of science: -

1- verbs that describe actions, events and relationships e.g. rotate, penetrate, absorb, possess etc.

2- verbs of general 'academic' discourse; he also calls them 'organization of knowledge' verbs: e.g. *appear consider, indicate, apply, assume* and *involve*.

2-**Suffixes and prefixes**

Morphology plays an important part in scientific English. A considerable size of vocabulary in EST is created by adding a prefix or a suffix to the root word (see Appendix 1).

3- Abbreviations:

Abbreviations are common in EST. Some of the basic abbreviations are:

c. centigrade

e.g. for example vs.versus

ft. feet yd. yard

i.e. that is

m. metre

sq. square

3.5.1.2 Features Beyond the Sentence Level

Features beyond the bounds of a single sentence can be contextual and rhetorical:

3.5.1.2.1Contextual Features:

The task of textual analysis is to identify the linguistic features that cause the sentence sequence to 'cohere' – something that happens whenever the interpretation of one feature is dependent upon another elsewhere in the sequence. The ties that bind a text together are often referred to under the heading of *cohesion*. Several types of cohesive factors have been recognized (Al – Jubouri, 1979: 145-147). McDonough, 1984:61, Crystal, 1997:119; and Glendinning and Holmström, 1998:13).:

a/Cohesive devices(logical connectors): Expressions like *therefore, for example*, *however*, *moreover*, *alternatively*, etc. have always had a high profile in EAP. They are generally seen as a key to understanding the logical relationships in texts, indicating what function a particular sentence is meant to fulfil. In other words, through notions such as contrast, result, and time, what is about to be said is explicitly related to what has been said before. For example a sentence which contains therefore is used to make a statement which follows logically from a previous statement.

b/Coreference features that cannot be semantically interpreted without referring to some other feature in the text. Two types of relationship are recognized:

(1) anaphoric relations which serve to relate one statement to another, by using pronouns that refer to something already mentioned, i.e. by looking backwards ← for their interpretation.

e.g. Several people approached. They seemed angry.

(2) cataphoric relations which look forwards: →

Listen to this: John's getting married.

(see also Akmajian et al., 1997:48, and Finch, 2000:202,204)

c/ Substitution: one feature replaces a previous expression.

e.g. I've got a pencil. Do you have one?

d/Relationships between statements: In technical writing there is not always an explicit indication of the communicative function of sentences. Writers usually assume that readers will realize how a particular sentence is to be understood without the assistance of such indicators as however, consequently, for example, etc.

e/Ellipsis: Ellipsis occurs when material which is felt to be unnecessary for the comprehension of the message is omitted, and such omission can be recovered only from the preceding discourse. In fact, some structures allow writers to omit words to avoid unnecessary repetition, though such ellipsis may cause problems.

e.g. The exploitation of energy will guarantee a more pleasant way of life. But for how long?

f/Lexical relationships: One lexical item enters into a structural relationship with another.

e.g. The flowers were lovely. He liked the tulips best.

Or different words, which stand for the same thing may be used in one text.

g/Comparison: A compared expression is presupposed in the previous discourse:

e.g. The house was bad. This one was far worse.

It can be concluded that a text plainly has to be coherent as well as cohesive in that the concepts and relationships expressed should be relevant to each other, thus enabling the reader to make plausible inferences about the underlying meaning.

3.5.1.2.2 Rhetorical Features:

In EST rhetorical features include "judgements concerning the order of the presentation of information, within the paragraph and within the total piece of which the paragraph is a part, and judgements on clarity and precision of exposition" (Lackstrom, et al. 1975:250). In many cases students face difficulty in understanding the rhetorical functioning of language in use, i.e. in recognizing how sentences are used in the performance of acts of communication (Allen and Widdowson, 1985:74).

3.5.2 Features of Communicative Activities in EST:

These features reveal how the language system is realized in particular instances as communicative activity. These features are realized in ways in which EST describes the phenomena and processes which the scientist or technologist is concerned with, as well as communicative activities such as observation, explanation, conclusion, prediction and proof.

A brief list of these activities is as follows:-

1- Description which can be classified as description of form, description of structure, and description of processes.
2- Definition
3- Classification
4- Generalization
5- Induction
6- Deduction
7- Instruction
8- Prediction
9- Measurement (Al-Jubouri, 1979:149f)

3.5.3 Non – Verbal Features:-

These features include tabulation and diagramming as well as operations, symbols and formulae. Tables and diagrams present information by collecting facts and arranging them in an orderly way. Operations and formulae reveal relationships of different types at various levels.

Sebranek et al. (1999: 302-306) illustrate the use and types of some of these non – verbal features as follows:

(a) A graph is a picture of information which is often called data. The most common kinds of graphs are line graphs, pie graphs, and bar graphs.

(b) A table organizes words and numbers so that it is easy to see how they relate to one another. Though tables can be custom – made to meet special needs, the common kinds of tables include comparison tables, distance tables and conversion tables.

(c) A diagram is a drawing of something that shows how it is put together, how its parts relate to one another, or how it works. The most common types of diagrams are picture diagram, line diagram and flow diagram (for more details, see 3.10.9.3 below).

3.6 ESP and Theories of LL :

Understanding how people learn is not always given due attention in ESP research and materials. Since language analysis is over – emphasized in ESP, learning factors are incorporated only after the language base has been analysed and systematised.

"Language can only be properly understood as a reflection of human thought processes. Language learning is conditioned by the way in which the mind observes, organizes and stores information" (Hutchinson and Waters, 1987:39).

Following a similar pattern, developments in learning theories have kept apace with those in language descriptions, and each has had some effect on the other three main stages of development, which are relevant to the needs of the ESP learner and teacher, can be identified. The following sections provide information about the more recent learning theories (see ibid. :40-48).

3.6.1 Behaviourism: learning as habit formation:

This simple but powerful theory said that learning is a mechanical process of habit formation and proceeds by means of frequent reinforcement of a stimulus – response sequence. The simplicity and directness of this theory provided the theoretical under – pinning of the widely used audiolingual method of the 1950s and 1960s. Some of the precepts of this method are: -

1- Never translate.
2- New language should always be dealt with in the sequence: hear, read, write.
3- Frequent repetition is essential to effective learning.
4- All errors must be immediately corrected.

3.6.2 Mentalism: thinking as rule – governed activity.

On the basis of their experience and empirical evidence, language teachers believed that the audiolingual method and its behaviourist principles did not deliver the results promised. Language learners insisted on translating things, asked for rules of grammar, found repeating things to a tape recorder boring, and somehow failed to achieve fruitful learning through repetition.

The first successful assault on the behaviourist theory came from Chomsky (1964). He tackled behaviourism on the question of how the mind was able to transfer what was learnt in one stimulus – response sequence to other novel situations, i.e. the ability of the human mind to cope with an infinite range of possible situations out of a finite range of experience. The mentalist view of the mind as a rule – seeker led naturally to the cognitive theory of learning. To the mentalist LL is not the product of parrot – like imitation, rather it is the result of a creative construction process.

3.6.2.1Cognitive code: learners as thinking beings:

In contrast with the behaviourist theory of learning that portrayed the learner as a passive receiver of information, the cognitive view takes the learner to be an active processor of information. An example of this is learning and using a rule, which require learners to apply their mental powers in order to distil a generative rule from the mass of data presented, and then to analyze the situations where it can be applied.

The basic teaching technique associated with a cognitive theory of LL is the problem – solving task. In ESP such exercises have often been modeled on activities associated with the learners' subject specialism.

More recently, the cognitive view of learning has had a significant impact on ESP through the development of courses to teach reading strategies. The major component of ESP projects should focus on making students aware of their reading strategies so that they can consciously apply them to understanding texts in an FL.

3.6.3 The affective factor: learners as emotional beings.

People think but they have feelings. The emotional/affective aspect of the learner and its relationship with the cognitive one is extremely important and relevant. While the cognitive theory holds that learners will learn when they actively think about what they are learning, the proponents of the affective theory believe that the emotional reaction to the learning experience is the essential foundation for the initiation of the cognitive process. How the learning is perceived by the learner will affect what learning, if any, will take place. Figure (2) displays the cognitive/ affective interplay.

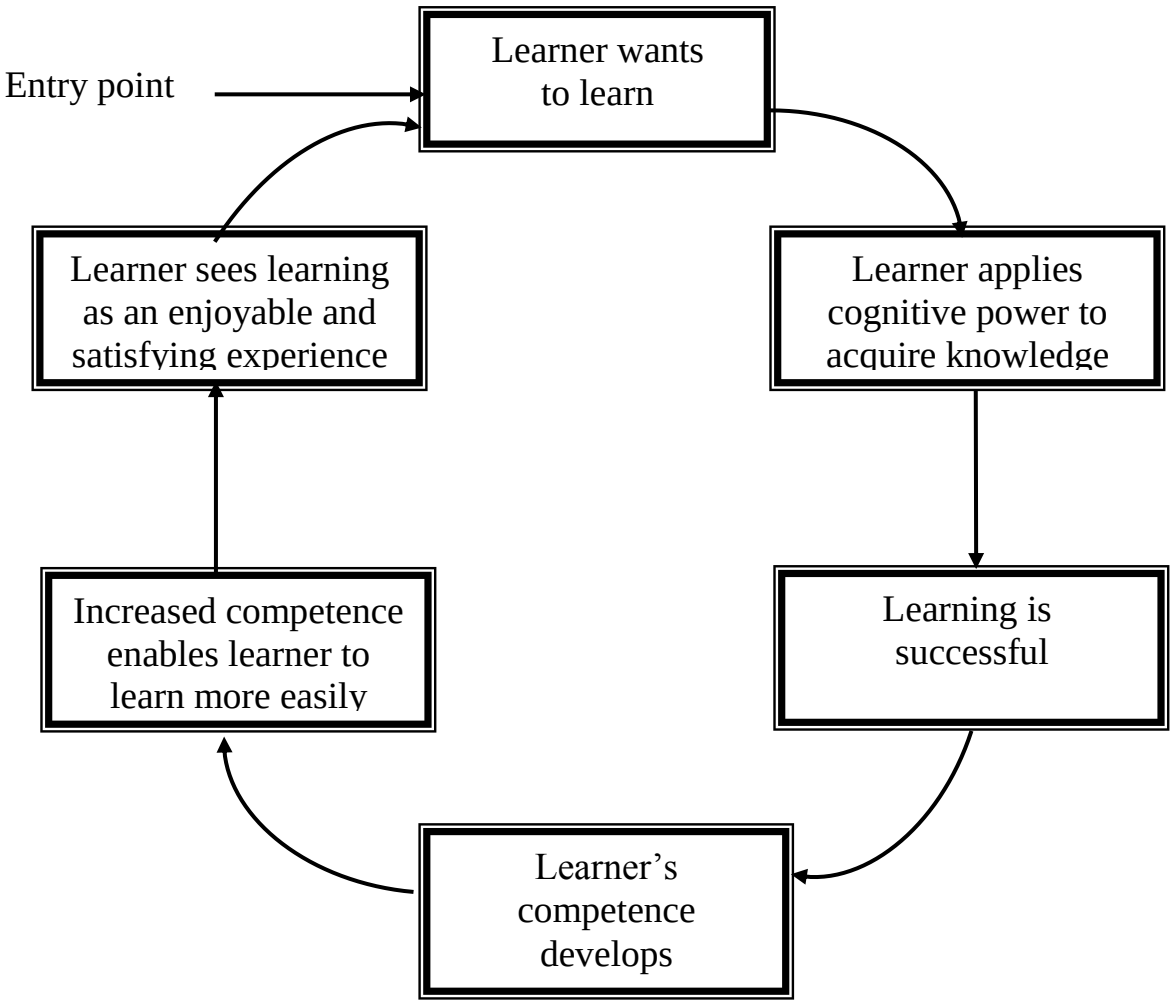


Figure 2 Positive learning cycle after cognitive/affective interplay.

(After Hutchinson and Waters, 1987:47)

3.7 The Role of the ESP Teacher:

According to Blue (1981:62f) and Silberstein (1994:10), the reading teacher in general, and the ESP teacher in particular, can create an environment of independent problem – solving readers who choose what to read and who practise and develop their own personal strategies for efficient reading. In this context, the primary aim of the teacher is to encourage the learner to work out and develop a battery of activities that will be most useful to him. The same idea is held by Nuttall (1987:22) who asserts that the teacher's job is to provide, first suitable texts and second activities that will focus the students' attention on the text. Although the student must depend on himself in developing his own reading skill, the teacher must make him aware of what he is doing, and interested in doing it better. The teacher should provide techniques for approaching texts of various kinds to be read for various purposes.

Although the methodology of ESP teaching may not differ radically from that of general English, there are some features that distinguish the role of the ESP teacher from that of the general English teacher.

Firstly, the ESP teacher is a 'practitioner', indicating that his role is one of many parts. In addition to the normal functions of a classroom teacher, the ESP teacher is likely to deal with needs analysis, syllabus design, materials writing or adaptation and evaluation. Secondly, since the majority of ESP teachers have not been trained as such, they find

themselves in a new environment for which they have generally been ill – prepared, and to which they need to orientate themselves (Hutchinson and Waters, 1987:157). Thirdly, according to Dudley – Evans and St John, (2000:13), the teacher is not in the position of being the 'primary knower' of the carrier content of the material. In some cases the students may know more about the content than the teacher, especially where the course is specifically oriented towards the subject content or work that the students are engaged in.

Concerning the third point, although the ESP teacher cannot be an expert in all the different subject areas and need not understand all intricacies of a text, what he needs is an intelligent approach to subject matter of all kinds. At least he must have sufficient background knowledge that enables him to help the learner define the linguistic categories and analyze his own linguistic needs (Blue, 1981:63f). What the ESP teacher requires in this respect is three things only:

1. a positive attitude towards the ESP content;
2. a knowledge of the fundamental principles of the subject area;
3. an awareness of how much they probably already know.

This can be summed up as the ability to ask intelligent questions. In handling the various roles that he is assumed to undertake, the ESP teacher needs a great deal of flexibility and willingness to listen to the students and draw on their knowledge of the subject content. He also needs to develop an interest in the disciplines or professional activities the students are involved in.

To conclude, it is not necessary to follow an approach that is based on one learning theory. The approach adopted is to be eclectic, i.e. to adopt what is felt to be useful for each particular situation according to the knowledge and expertise of the teacher. For instance, he may choose a behaviourist approach to the teaching of pronunciation, a cognitive

approach to the teaching of grammar and use affective criteria in selecting his text.

3.8 Factors Influencing ESP Teaching and Learning.

3.8.1 The Role of English:

English plays different roles in ESP that range from its use as a medium of communication in business in some countries to a more restricted role as a subject on the school curriculum. Consequently, ESP programmes are greatly affected by such differences since the students' knowledge of English and their need for it will vary according to their exposure and familiarity with English and its usefulness to them (Kennedy and Bolitho, 1984:11).

3.8.2 The Learner:

(One) Age: It is noteworthy that many ESP learners are adults. This is associated with the fact that the older a learner is the more likely he is to have his own definite idea on why he is learning English.

(Two) Level: In performing his task in teaching both language and content, the teacher has to choose texts that are significant to the students in their content and suitable for their level.

(Three) Motivation: With high motivation a learner is much more likely to succeed. Motivation is of two main kinds: instrumental and integrative motivation. Instrumental motivation to learn English, according to Roe (1977, in ibid.: 15), represents a system of three levels: level one, the highest level, to obtain a degree or a desirable

job or to get promotion; level two, to improve examination grades or influence positively career prospects; and level three, to increase the student's status, be useful when he travels abroad or widen his knowledge and interests. Integrative motivation makes the learner identify with the social or cultural aspects of learning English.

(Four) Attitudes to Learning: Recognition of negative feelings and attitudes to an ESP course that some students have due to their previous unsuccessful experience of learning English has urged writers to develop material which differs from the type of learning experience the student has had in the past to motivate him to overcome his initial reluctance to study English. This development takes the from of a functional approach with texts more closely linked to the skills required by the student (ibid.:17).

3.8.3 The Linguistic Aspect:

The type of English necessary to be taught to enable the learner to achieve his purpose is the central point of any analysis of needs. The learner may need to be taught a certain vocabulary, specific forms and functions and how these functions interrelate to produce coherent texts.

As shown earlier, scientific English uses the same structures as any other kind of English but with different distribution. Passives and complex nominal groups, for example, are more likely to occur, while there are few occurrences of question – tag forms. Since grammar may be used in specific ways in scientific texts, reference to a general English grammar may not be helpful (ibid.:18).

3.9 Reading Skills in ESP:

Although readers of scientific texts utilize the same general reading skills used to process and comprehend other types of texts (see 2.4.2

above), they also make use of other reading skills that are specifically related to ESP. It should also be noted that the purpose of reading and the balance between skills and language affect the teaching of reading in ESP.

In fact, the skills needed for understanding any text are geared and directed by the purpose of reading that text. Dudley – Evans and St John (2000:95-6) report that one of the most important contributions to the approach to reading in ESP was a shift from 'Text As a Linguistic Object' to 'Text As a Vehicle of Information'. Johns and Davies (1983, as cited in ibid.) encapsulated the key principles that, for ESP learners,

> **"extracting information accurately and quickly is more significant than language details; that understanding the macrostructure comes before language study; and that application of the information in the text is of paramount importance. The reader first processes the language and then links the ideas to what is already known."**

A good balance should be maintained between skills and language development. This point of view is supported by Hosenfeld (1977, as cited in ibid.) who has shown that less successful FL learners had a fragmented approach to text, while successful learners went for overall meaning, guessing or skipping language and information, ascribing poor reading in an FL to poor reading in the mother tongue (L1) and an inadequate knowledge of the FL itself. Alderson (1984, as cited in ibid.) has shown that learners need to reach a threshold level of language knowledge before they are able to transfer any L1 skills to their FL reading tasks.

Acquisition of good 'general' reading skills and an adequate mastery of the language enables the adult reader of scientific texts to a

more advanced stage that requires, as Thonis (1970:92) puts it, a great deal more attention to details, a slower and more thoughtful pace of reading, an understanding of other graphic material like charts, tables and figures, and new, more encompassing comprehension skills.

Since most scientific books are characterized by the presentation of a few main points in each section and many examples or explanations as supportive facts, the ability to sift through the paragraph and to identify the key idea and the major and minor details supporting it, is very important to reading success in science. Thonis (ibid.:93) goes on to say that science, like mathematics depends upon an orderly progression of steps in thinking. One of the sequences he suggests is the following:

> **"state the purpose, define the problem, delimit the problem, define the terms, identify the materials needed, describe the procedure to be used, list the measuring instruments, collect the data, analyze the data, make inferences, draw conclusions, suggest possible applications or implications of the findings, make recommendations for further investigations and cite sources and references."**

All these scientific steps require appropriate corresponding skills on the part of the reader. The teacher's task here is to supply suitable teaching techniques that develop and promote these skills, and this is the main focus of the next section.

3 . 10 Recommended Remedial Teaching Techniques

Reading is best taught as a set of skills to be learned rather then as a language process to be mastered. Goodman (1970 ,as cited in Guthrie , 1976:165) holds the view that there is no possible sequencing of skills in

reading instruction since all systems must be used inter dependently in the reading process even in the first attempts at learning to read.

In the selection and adoption of certain teaching techniques one should notice that "there is no simple recipe by which one can always teach reading to all students. Some students benefit from more intervention in the reading process than do others (Krashen and Terrell, 1983:46). Whereas some students enjoy risk taking , others require a good deal of encouragement. Explicit instruction in reading strategies is more useful for some students than others. It is possible for teachers to make principled decisions moment-by moment about reading instruction Derived from systematic questioning of the teaching context, determining how to respond to student needs and queries (Silberstein , 1994 : 15f)

Classroom procedures should reflect the purposeful task – based, interactive nature of real reading. This interactivity can be fostered in the reading Classroom through procedures involving pair work and group work in which inter–learner discussion of the text and associated tasks is not only permitted but required. Exercises in this respect include the completion of a diagrammatic representation of (part of) the text – matrix flow – charts, tree diagrams , picture and line diagrams ,etc . (Williams , 1986 :43)

Silberstein (1994 : 43) suggests a model reading lesson in which students discuss a text in advance to provide a context for reading and to develop expectations about what they are required to find. Often students will preview a text trying to identify – from an initial rapid over-view – its overall organization and the clues to content and points of view. When students read they usually do so with a particular goal in mind . Such goals will help determine the strategies with which to approach a text , and provide the road map for helping students to become efficient readers

Before shedding light on the three phases of reading instruction advocated by many scholars, a useful distinction is needed between cognitive and metacognitive strategies. Urquhart and weir (1998 : 179) consider cognitive strategies as the more familiar mental processes that enable us to read, ranging from working out the meaning of words in context through skimming a text quickly to extract the gist. Metacognitive strategies, on the other hand, are more concerned with thinking about the reading experience itself and are seen to involve

> **learners stepping outside their learning , as it were , and looking at it from outside. Such strategies included an awareness of what one is doing and the strategies one is employing, as well as knowledge about the actual process of learning. They also include an ability to manage and regulate consciously the use of appropriate learning strategies for different situations. They involve an awareness of one's own mental processes and an ability to reflect on how one learns , in other words , knowing about one's knowing (Williams and Bnrden, 1997 : 148)**

Training in metacognitive strategies is a relatively new departure in second language teaching of reading . Such training is best shown in the three stages of reading instruction as follows :

1-**Pre – reading (planning) activities** :

Pre – reading activities are used before the students read the entire text. These include brainstorming, class discussion, anticipating content and other tasks that can be summarized, according to Urquhart and weir (1998 : 184 – f) ,in two main categories : previewing and prediction .

One. **Previewing** :

Previewing can be used to make a decision whether to read a book , on article or text. It involves

– thinking about the title .
– reading appendices quickly .
– reading indices quickly .
– reading the abstract carefully .
– reading the preface, the forward and the blurb carefully .

However in the classroom context, previewing may be very useful , particularly for EAP students . It has obvious links with expeditious reading strategies particularly skimming for gist. (Urquhard and Weir : 184 , and Grellet , 2002 :17f)

b. **Prediction :**

Prediction means making intelligent guesses about what a text book, chapter or section contains using only a small sample of the text. It is considered as an important skill when choosing what to read.

This strategy is used to anticipate the content of a text; to make hypotheses about the macropropositions it might contain. (Glendinning and Holmström ,1998 : 20 – 4)

Prediction or ‘ anticipation ’ increases motivation because learners start reading the text prepared to find a number of things in it, expecting to find answers to a number of questions and specific information or ideas they are interested in .

In this respect teachers are advised to spend some time getting the students ready to read a given text. Before the students start reading a text, they can always be asked to look for the answers to specific

questions. This will give an incentive to their reading activity. A few other possibilities are suggested in the exercises :

- psychological sensitizing aimed at making the students think about the subject of the text and ask themselves questions .
- using the title and pictures to talk about the various ways the text may develop .
- Using the key words of the text. (Grellet 2002 : 18)

2 . **While – reading (monitoring) activities** :

Pearson and Fielding (1991 : 836 – 9) identify two generic while – reading strategies and practices to support students to engage independently and actively with text. These are self – question and self – monitoring .

a – **Self – questioning :**

It is a characteristic of good reading because it promotes cognitive processes such as inferencing, monitoring, understanding and attending structure. Nuttall (1996, as cited in Urquhart and Weir 1998:186) describes this activity as interrogating texts ; text talk . the SQ3R technique is very helpful in this respect. Palincsar and Brown (1984), as cited in ibid., focus on teaching summarizing , questioning , clarifying and predicting skills. They emphasize the fact that these activities if engaged in while reading , enhance comprehension and , at the same time, give the student the opportunity to monitor whether comprehension is succeeding .

b- **Self – monitoring** :

Monitoring one's own comprehension – checking that comprehension is taking place and adopting remedial strategies when it isn't – characterizes skilled reading . (Urqnhart and Weir 1998 : 186)

By asking themselves whether they understand, learners are asking whether it fits in with what they know already. Thus they learn how to understand what they read in the process of learning how to monitor their comprehension (Pearson and Fielding 1991 : 847).

3- **Post – reading (evaluation) strategies :**

Questions of evaluation and personal response are also seen by teachers and course book writers as a valuable post - reading activity. Readers can be encouraged to relate content to their existing schemata and to evaluate it in the light of their own knowledge and experiences . This promotes greater interaction with text and may lead to more successful reading encounters.

In this stage , (Nuttall 1987 : 164) asserts that it is the time to reconsider the hypo theses that students made about the text in the early stages. Their opinions about the writer's aims , about the main message of the text, etc. Can be substantiated and refined, or if necessary rejected and replaced.

The work to be done at this stage may include some of the following .

(One) eliciting a personal response from the reader (agree / disagree ; like / dislike , etc .)

(b) linking the content with the reader's own experience / knowledge .

(c) suggesting particular applications of theories or principles .

(d)drawing comparisons / contrasts between facts , etc. in this text and others .

(Five) recognizing relationships of cause and effect .

(Six) ascertaining chronological sequence (e. g. where a narrative shifts from one time to another or uses flashbacks) .

(Seven) distinguishing fact from opinion .

These aspects and others are introduced to the students in the form of various exercises that come after each reading selection and that check their comprehension such as multiple – choice , true – false , matching , completing tables, vocabulary and structure exercises (See Appendix 3).

Scholars and specialists in reading and reading instruction , especially ESP reading , have enriched the literature in this field with their contributions and suggestions for specific teaching techniques that have found their way to application in many reading classrooms. Some of these techniques which have been adopted and utilized by the researcher in this study are the following :

3. 10 . 1 <u>The four ‘ I ‘ S</u> :

The four ‘ I ’ s are one way of sharing responsibility within the class and a route to dealing with learning and feed back constrains. It means :

Involvement

Interaction

Individualization and

Independence .

The four ‘ I ’s stem from the fact that learning is a social process and that people naturally ask each other questions when they are left to themselves. Involvement means that all that is required from the

instructor is to allow learners to consult each other and to interact by introducing pair and group work . Also each person must be allowed to be an individual and work and contribute in his own manner. Independence results from the teacher allowing students to learn in their own ways rather than controlling them through teaching (Dudley – Evans and St John , 2000 : 200) .

3. 10 . 2 The deep – end strategy :

This strategy is an advanced version of the ppp (present , practice , perform) tradition of EFL. The ppp technique can work effectively for beginners to intermediate or when both the language and the communicative event are new to the learner. The deep – end strategy is particularly effective on short intensive courses and where learners are proficient in the communicative events in their L_1. The learners use their existing L_2 competence , discovering where it is adequate and where it fails them .

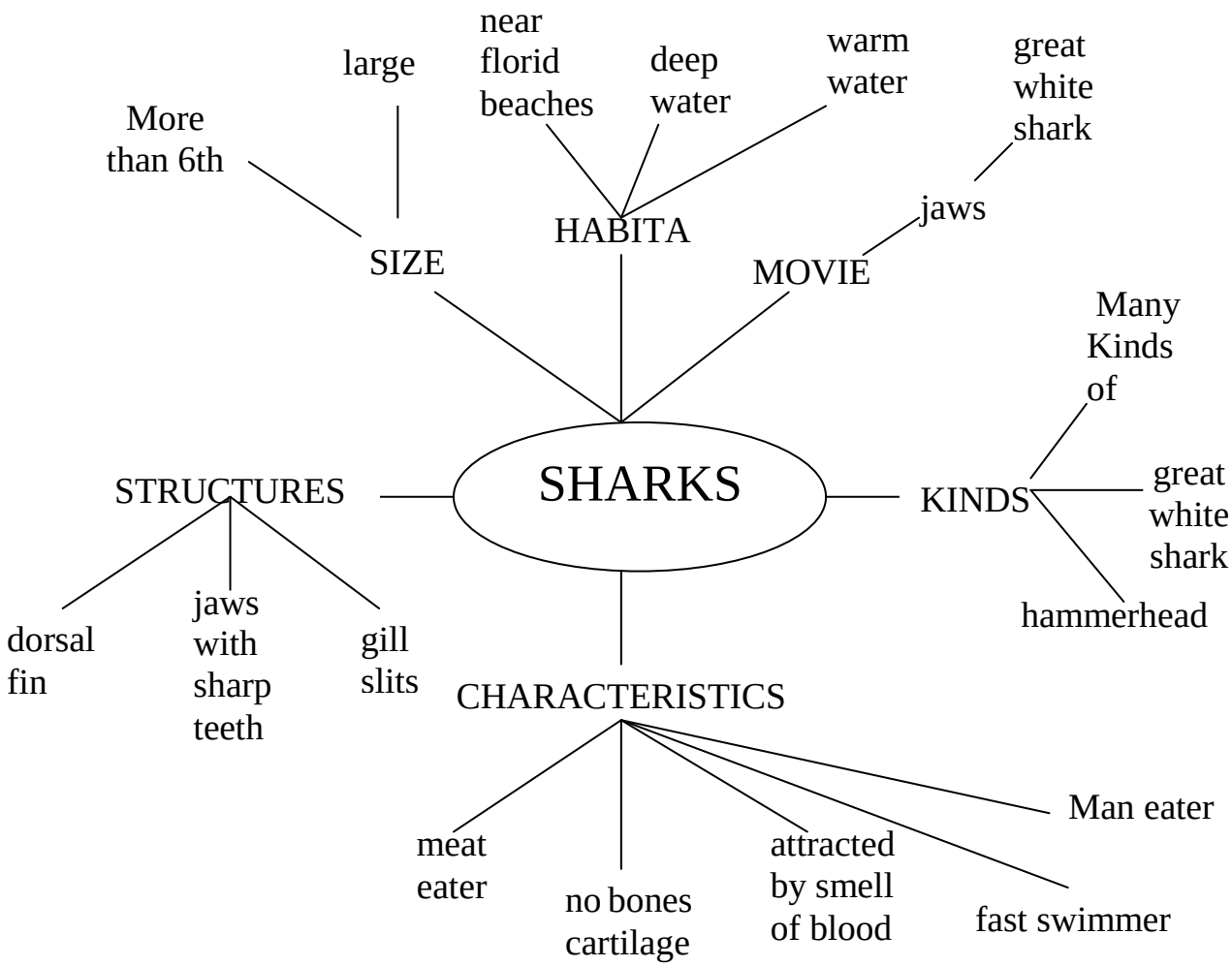
The main principle of the deep – end strategy is to set a task and ask students to perform taking performance as its starting point . This strategy involves providing preparation time before performance --- The strength of the deep – end strategy is that the approach to the task is the students , and is likely to reflect their personal and professional world . (ibid : 190)

3.10.3 Semantics maps :

One technique that allows students to demonstrate their understanding of the relationships among ideas within a text is the drawing of the **semantic maps**. Semantic mapping allows students the freedom to present a hierarchy of ideas in a diagram format that is uniquely theirs .

Semantic maps can be used both pre - reading and post - reading . As a pre - reading technique , students can categorize their associations on a topic before reading. On the other hand, students can develop post - reading maps that reflect the actual associations and information found in the text. (Silberstein 1994 : 49-52) (See Figure 5 below)

Figure 3 Semantic Map



(After Silberstein, 1994 : 50)

3.10.4 Handling text structure :

Students can learn to recognize whether an argument is inductive or deductive: whether the author begins with a generalization, which is then supported (deductive argumentation), or builds toward a final generalization (inductive argumentation).

Students can practice this technique by identifying the type of argument in varieties of articles and selections in their fields. Their attention must be called to the techniques employed by writers to signal paragraph organization (ibid. :53 and Dlugosz 2000 :284-290).

3.10 .5 Recognizing Rhetorical Patterns

This technique can facilitate reading comprehension. Students' attention should be drawn to the relationship among ideas within a reading passage. This is to be done through activities provided for each of the following patterns (ibid. : 54-7):

One- Comparison and contrast.

Students are to be given articles in which claims are made on the basis of similarities and differences. Students locate items being compared and areas of contrast (See Appendix 4 (a)).

Students are asked to complete a table and then to compare and contrast the similarities and differences. (see table 1 below)

Table 1

An example of the pattern of comparison and contrast

Characteristics	Eye	Camera
The image is inverted		
The lens focuses the image		
Sensitive to light, shade, and color		
Produces three-dimensional image		

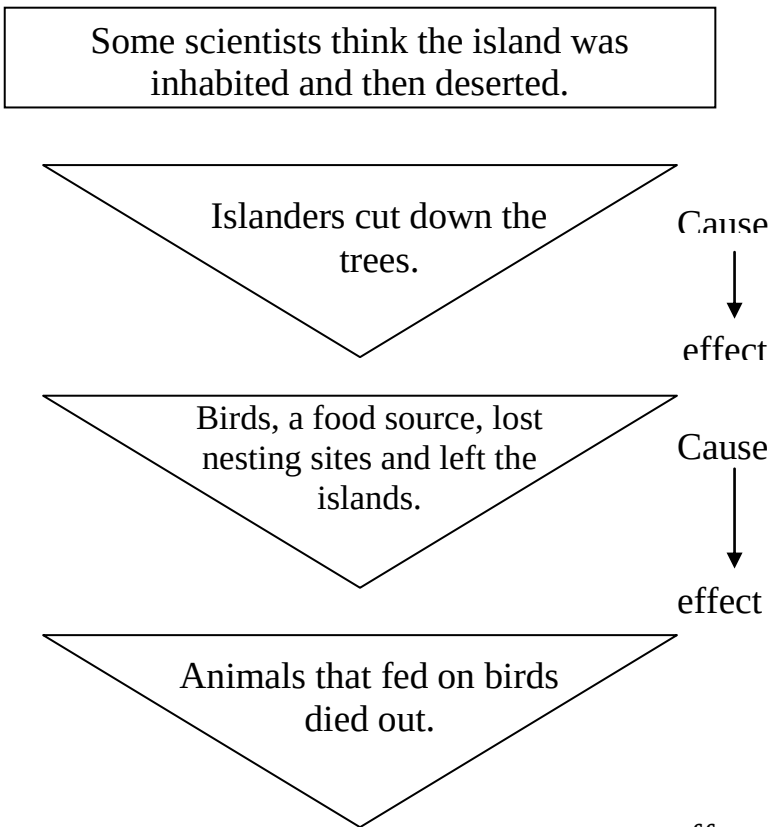
(After Silberstein 1994 : 55)

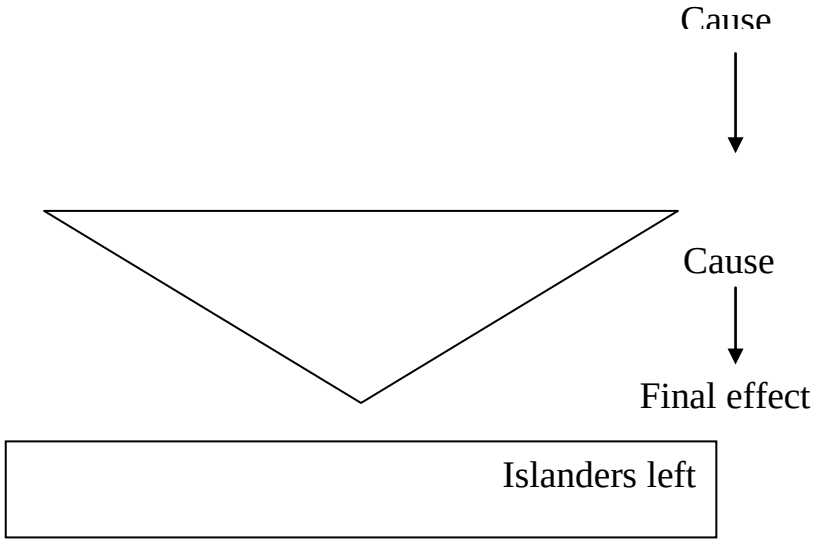
b- Cause and effect.

The reader is asked to accept the fact that there is a casual relationship between factors cited and results. Students are to be given exercises in which they identify causes and effects, then evaluate whether the claim(s) for causation prove convincing. In this case a type of organizer can be used to keep track of important information that shows cause and effect. (See Figure 4 below and Appendix 4 (b))

Figure 4

An example of the pattern of cause and effect





(After Sebrank et. al. 1999 : 317)

c- Chronological Order (Time sequence).

Some texts are structured on the basis of time. Such texts describe events in the order in which they occurred or in reverse chronological order. To improve students' skills in this field , the teacher can ask them to complete a time line or otherwise place events in sequence or correct an incorrect order. This type of activity in which students rearrange a text in order to create a logical sequence , is often called **jigsaw reading** .

d- Classification.

Such passages are structured by classifying information on the basis of hierarchy of categories. As a technique students can be asked to complete charts, outlines or diagrams, or to create their own semantic maps .

e- Process.

These texts describe a process, for example, how to build a dam or a house. Process texts often contain diagrams and illustrations that allow students to practice integration prose and nonprose information. The

students can be asked to reproduce the process or to describe it for someone else who must carry it out .

f- Definition.

Texts can be built around definitions. In order to practice gaining information from passages structured around definitions, students can be asked to guess the focus of passages that have had the key term(s) omitted.

3.10.6 SQ3R.

The SQ3R is a procedure first introduced by Frances Robinson for individual and independent study. It is advocated for use at the secondary and collage levels due to the increments in reading achievement it has yielded. Teachers have found that if students read two comparable selections, one by their usual method and the other using the SQ3R method , and are quizzed for recall, they will usually see that they have greater recall and understanding with the SR3R .(Shephered, 1973: 102) .

The steps of the procedure are :

Survey −The student surveys the introductory statement , the headings and summaries quickly to get the main idea and general scope of the material.

Question –The student formulates his own purpose questions . Teacher – directed questions can also be helpful and serve as purpose questions .

Read – The material is read to answer the purpose questions .

Recite _The student pauses to relate to himself the answer to his question.

Review −The student looks through the material to perceive again the organization and basic ideas and to put down some useful notes . (Newton, 1960: 81 f; Shepherd, 1973: 103; and Worden, 2000: 8)

3.10.7 Note- taking .

Note-taking is one of the useful techniques for making study reading active since it compels the student to think about what he is reading when he writes down notes in his own words. It also makes reviewing easier, especially when the notes are brief (for more information see Al-Qaraghooly, 2001).

Notes may take several forms. Students should pay attention to the following specific principles :

1) The notes should be in the student's own words.

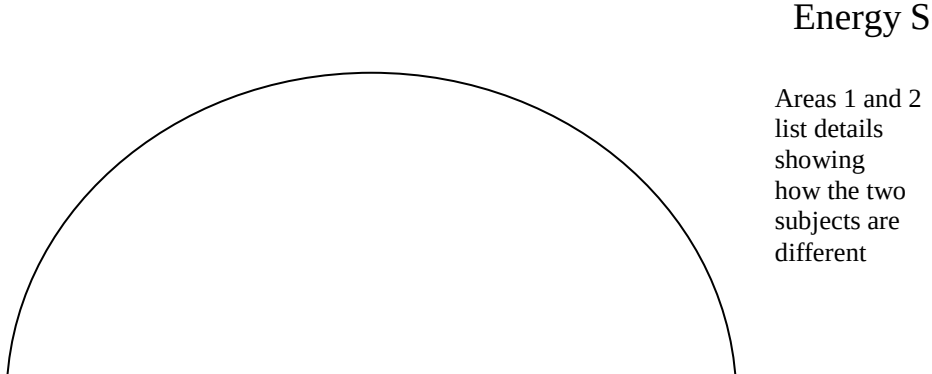
2) The notes should be brief.

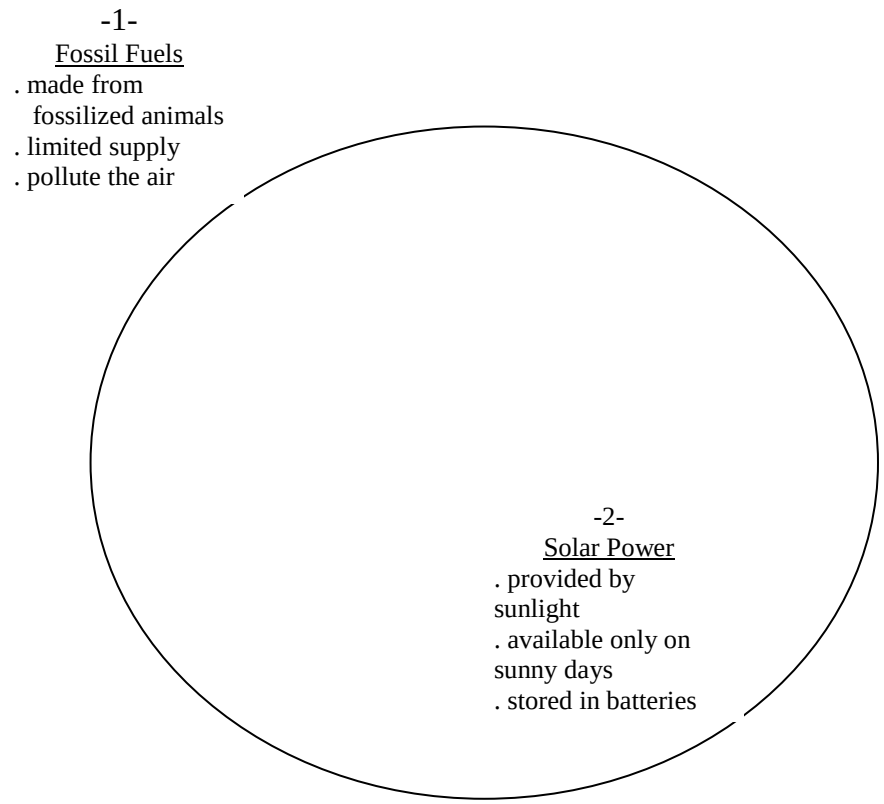
3) The student should note hints to structure. He should be alert to the main idea by such clauses as "remember" " the essential difference in" etc.

4) The student should be urged to invent a code of observations – abbreviations and symbols can be used to reduce the length of his notes and save time. (Sheperd, 1973: 104).

Notes can take different forms and shapes such as using a web to help students organize information or table organizer, when a selection follows the main idea ./supporting details pattern. So the table top names the main idea and the legs of the table list supporting details. In comparing two subjects, the Venn diagram can be used . (Sebranek et al , 1999 : 309-313) (See Figure 5 below and Appendix 4 (c))

Figure 5 (The Venn diagram)





3 . 10 . 8 KWL :

(After Sebranek et al, 1999 : 313)

It is a good study – reading strategy to use when the student already knows something about the topic . KWL stands for what I "know", what I "want to" know and what I "learned". The student is to divide a sheet of paper into three columns and put a K , a W and an L above the columns . Then he is to list what he already knows about the topic in the column K. Then he begins to fill in the W column with questions he wants to explore . After reading the passage , he fills in the L column with things he learned or

still hopes to learn see app .

K	W	L

What do I know ?	What do I want to know ?	What did I learn or what do I still want to know ?

3.10.9 Understanding Graphs , Tables and Diagrams :

ESP teachers should train their students to understand these non-verbal features that mostly characterize ESP writing . Sebranek et al . (1999: 302 –6) explain these features as follows.

3.10.9.1 Understanding Graphs: Graphs are pictures of information that have several kinds :

One. Line graph : it shows how things change over time. It starts with an L-shaped grid. Students are to be informed that the horizontal line off the grid stands for passing time (seconds , minutes , years or even centuries). The vertical line of the grid shows the subject of the graph .

Two. Pie graph : it shows proportions and how each proportion or part relates to the other parts and to the whole pie .

Three. Bar graph: it uses bars or columns to show how different things compare to one another at the same time . Unlike line graphs, bar

graphs do not show how things change over time . A bar graph is like a snapshot that shows how things compare at one point in time .

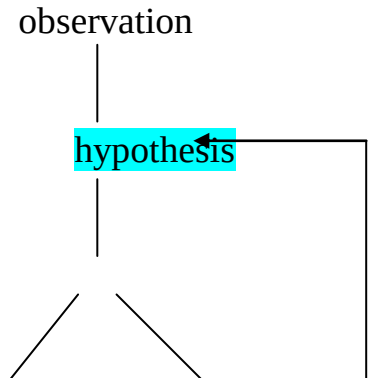
3.10. 9.2 Understanding Tables: Tables enable readers to see the relationships between words and numbers by organizing them in certain ways. Students' attention must be drawn to the fact that each table has rows (going across) and columns (going down) . Rows contain one kind of information . Some common kinds of tables, distance tables and conversation tables .Tables can also be custom –mode to meet special needs .

3.10.9.3 Understanding Diagrams: The commonest types of diagrams are

One. picture diagram : It is a picture or drawing of the subject being discussed. Some parts of the subject may be left out of the diagram to emphasize the parts the writer wants to show .

Two. line diagram : it uses lines , symbols and words to help the reader , identify the relationship among ideas. The problem –solving diagram below is a common kind of line diagram that helps reader understand how to solve a scientific problem

Figure 6 (problem – solving diagram)



Experiment

Retest discard

Theory

After Sebranek et al , 1999 :306

Three. flow diagram: This type can serve best in teaching the passive voice as the latter " constitutes a problem area in many language courses " (White, 1978 : 188). The passive voice is often associated with descriptions of process. A process consists of the following elements:

" Descriptions of process are very common in scientific and technological literature " (ibid.). After reading the text several times and pointing out the steps of the process on the blackboard, or by using the overhead projector (See table 2).

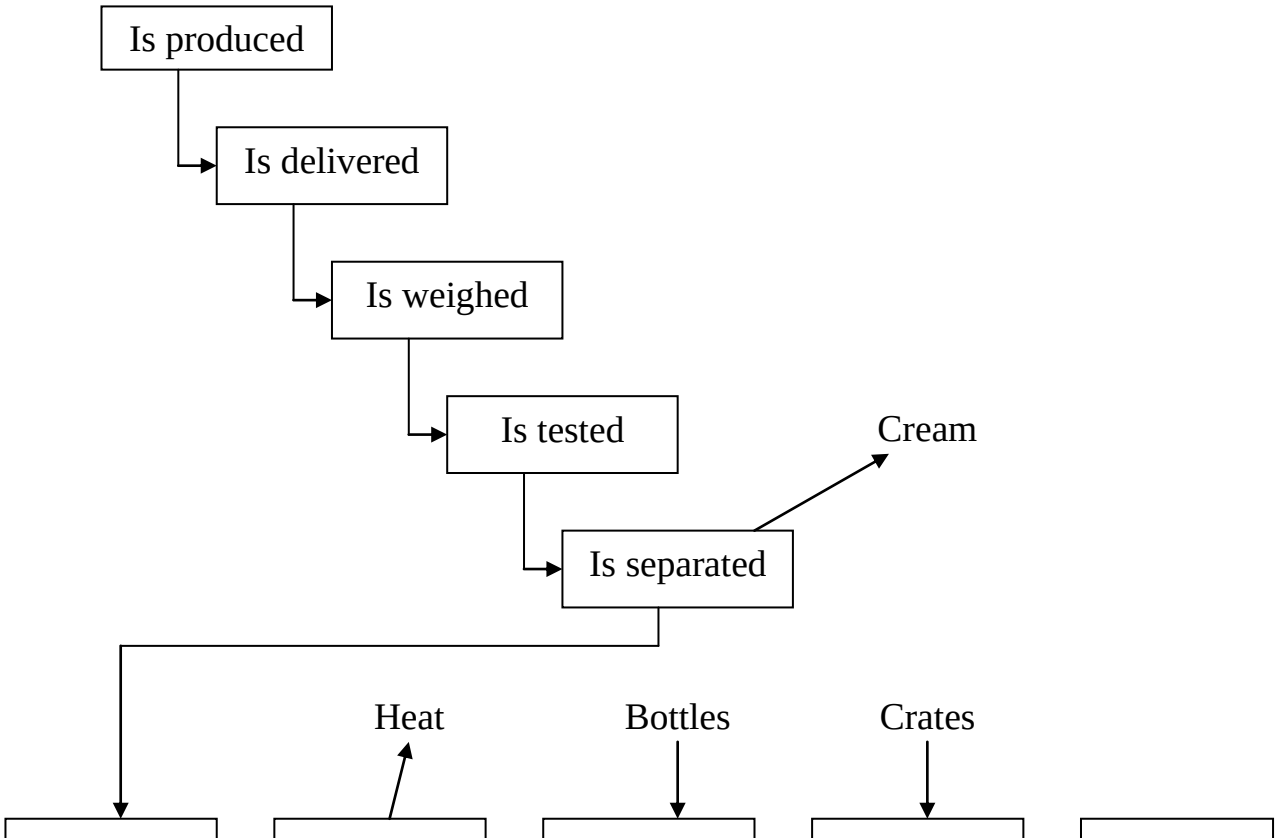
Table 2 : How Milk is Processed

Sequencer	Subject	Verb	Adverbial	Full stop
	Milk	is produced	on dairy farms	.
	The milk	is delivered	to a factory by tanker	.

	The milk	is weighed		.
And then	It	is tested		.
Next,	The milk	is separated		.
After this	The milk	is pasteurized	at a temperature of 72 ^{o}F	.
Then	It	is cooled		.
Next	It	is bottled		.
After this,	The bottles	are packed	into crates	.
Finally,	The milk	is delivered	to customers	.

The students can be instructed to reconstitute the text in written form, using the flow diagram as a cue. See the following flow diagram :

Figure 7 (Flow Diagram : How Milk is Processed)



(After White,1978: 190)

A concluding remark is noteworthy here. The cornerstone of all the above mentioned techniques is practice. Without ample practice under the teacher's guidance, no real improvement in students' RC is achieved. It needs a proficient teacher to gear an important process like this.

4.1 Introductory note:

This chapter is devoted to the presentation of a detailed description of all the procedural measures taken to achieve the aims of the study. These procedures fall into three stages: analyzing test papers of a sample of postgraduates to identify the linguistic difficulties that hamper their comprehension, suggesting certain teaching techniques to help students overcome these difficulties, and conducting an experiment in which these teaching techniques are put into application. So, this chapter includes (1) the population and sample of the study; (2) the identification of linguistic difficulties via error analysis; (3) the experimental design; (4) the instrument of the research including: (a) the suggested teaching techniques, and (b) the pre-post test;(5) the application of the experiment; (6) the scoring scheme; and (7) the statistical techniques used to calculate and interpret the results of this study.

4.2 Sample Selection Procedure

4.2.1 Population

The population of the present study is the postgraduate diploma students of the Building and Construction Department at the University of Technology for the academic year 2001-2002. The total number of the population is (700) students.

4.2.2 Sample

The sample of the study is of two types. The first one is the pilot study sample totaling 40 students chosen randomly from the population. The initial form of the test is administered to this sample for the purpose of establishing its reliability and analyzing the items. The second sample, which consists of

30 students, is also selected randomly. It constitutes those who are subjected to the experiment in which the suggested teaching techniques are applied.

4.3 Identification of Linguistic Difficulties

To achieve the first aim of the study; i.e. identifying linguistic difficulties that hamper comprehension of the prescribed scientific texts by postgraduate students, a random sample of 35 students' responses to their final course examination in the previous year is collected. Errors are analyzed and classified by the researcher into main categories (see Richards, 1974:20), calculating the percentage of each category (see table 3). The adopted model for error analysis is identified by the following steps:

1- Collection of a sample of learner language.
2- Identification of errors.
3- Description of errors.
4- Explanation of errors.
5- Evaluation of errors.

(For more details see 2.4.3.1 above)

Table 3

Percentages and frequencies of the main categories of errors made by postgraduate science students in RC.

Category of Errors	No. of errors	Percentage of errors %
Syntactic	205	72.44%
Spelling	47	16.61%
Expression	15	5.30%
Punctuation	16	5.65%
Total	283	100%

4.4 The Experimental Design

The design of any study is determined by its problem and the conditions under which it is carried out (Meyers and Grossen, 1978:163). Selecting an appropriate design increases the possibility of obtaining valid, objective and accurate answers to research questions (Christensen, 1980:158).

The experimental design adopted in this study is the One-Group Pretest-Posttest Design which can be displayed as follows:

Pretest	Treatment	Posttest
T1	X	T2

(Isaac and, Michael, 1977:37)

In this design, a pretest is administered to a group of students. Then, they are exposed to an experimental treatment after which they take the same test as a posttest. The experimental treatment in the present study is the teaching techniques suggested by the researcher.

4.5 Instruments of the Research

4.5.1 Teaching Techniques

In the light of the theoretical background of this research, a number of teaching techniques are selected and adopted to develop skills of comprehending science reading. Five units of the prescribed textbook(*) for postgraduate students in the Department of Building and Construction constitute the teaching material. The teaching and activities are adapted to the units of science being studied and the background abilities of the students. The teaching techniques and their relevant activities and exercises are shown in 3.10 above and Appendix 3.

(*) English For Computer Science, by Mullen and Brown, 1987

4.5.2 The Pre-Post Test

4.5.2.1Test Construction

An essential prerequisite in any attempt to devise adequate tests of RC is an evaluation of the skills displayed by the fluent reader, an analysis of the extent to which any such 'reading efficiencies' are composed of distinguishable sub – skills, as well as an analysis of the learning process in reading (Clark, 1976:101).

As shown in Chapter Two above the RC levels are classified into four: literal, interpretive (inferential), critical and creative. The test which is concerned with the first three levels is constructed on the basis of the analysis and classification of the students' errors (see 4.3 above) taking into consideration certain linguistic areas.

The objectives of the test are to ensure understanding of grammar and vocabulary and the development and application of reading skills to the point that makes reading effective. It is a criterion - referenced test and not a norm - referenced one in that

> **it measures students' performance against a pre-established criterion or set of objectives. …The evaluation of results on criterion referenced tests stresses the diagnostic function: the student must be made aware of his or her level of achievement and must be told how to strengthen the weak areas.** (Valette, 1977:43).

The teacher can help students overcome their weaknesses by modifying and diversifying the teaching techniques used.

The test falls into three parts: The first part deals with RC which includes 16 items. The above mentioned classification of the RC levels is adopted in the arrangement of these items. The items are designed in such a

way as to check the accuracy of what is read and to probe the students' abilities to assimilate and interpret more than superficial meaning.

The second part of the test, consisting of 24 items, deals with vocabulary while the third part, with 31 items, deals with morphology and syntax, since reading, according to Valette (ibid.:166), requires two fundamental building blocks on the part of the reader: structure and vocabulary. The items of these two parts are taken from Mullen and Brown (1987) and Glendinning and Holmström (1998).

4.5.2.2 Test Validity

In selecting or constructing an evaluation instrument the most important criterion to consider is validity. It refers to "the appropriateness of a given test or any of its component parts as a measure of what it is purported to measure" (Henning, 1987, as cited in Alderson et al. 1999: 170).

The most important kinds of validity to be considered when constructing an achievement test are face validity and content validity. The term "face validity" indicates whether the instrument, on the face of it and with superficial inspection of its appearance appears to measure what it claims to measure (Isaac and Michael, 1977:82). Content validity, on the other hand, is "the representativeness or sampling adequacy of the content-the substance, the matter, the topics-of a measuring instrument" (Kerlinger, 1973,as cited in Alderson et al., 1999:173). As Gipps (1995:58f) describes it, content validity concerns the coverage of appropriate and necessary content; i.e. whether the test covers the skills necessary for good performance or all the aspects of the subject taught.

To achieve face validity and content validity of a test in RC, the RC passages and the test items should be given to a jury of specialists in ELT

(Harris, 1969:18). So the test was exposed to a jury of experts[*] in linguistics and ELT for content and face validity.

In the light of the jurors' opinions, a number of modifications were made. The final form of the test is shown in Appendix 5.

4.5.2.3Pilot Study

Prior to the administration of a test, a pilot study is needed. Conducted on a group of subjects who are similar in background and level to those who will take the final examination, it can provide valuable information about the ease of administering the test, the time students need for completing it, the clarity of instruction, the kind of language being elicited in the open-ended questions, the usability of the marking scales, and so on. The results will reveal many unanticipated flaws in the test, and will save time and effort when the main trials are run. (Alderson et al., 1999:75). The pilot study is also useful in determining the difficulty level and discriminatory power of the test items.

(*) The jury members arranged according to their academic titles and then alphabetically, are: -

1- Professor Al-Rawi, Sabah S., Ph.D., College of Languages.

2- Professor Muslit, Abdul-Wahid M., M.A., College of Languages.

3- Assistant Professor Al-Ani, Lamya' A., M.A., College of Education/Ibn Rushd.

4- Assistant Professor Darwesh, Abdul-Jabbar A., Ph.D., Teachers College of Baghdad.

5- Assistant Professor Jihad, Ayad, M.A., University of Technology.

6- Assistant Professor Kana'n, Siham, Ph.D., College of Education/Ibn Rushd

7- Assistant Professor Ma'rouf, Firas A., M.A., College of Education/Ibn Rushd.

8- Assistant Professor Sa'ad, Abdul-Hamid, Ph.D., College of Languages.

9- Instructor Al-Bakri, Shaima' A., Ph.D., College of education/Ibn Rushd.

10- Instructor Al-Qaraghooly, Dhuha A., Ph.D., Teachers College of Baghdad.

11- Instructor Rassam, May, Ph.D., College of Languages.

12- Instructor Al-Rifa'i, Fatin K., Ph.D., College of Education/Ibn Rushd.

The initial form of the test has been administered to a sample of 40 students from the same population after the establishment of the face and content validity of the test.

4.5.2.4 Item Analysis

The procedure followed in item analysis is to separate two subgroups of test papers after ranking them descendantly according to their scores an upper group consisting of the top 27 per cent of the total group, and a lower group including the bottom 27 per cent. This percentage is considered the best proportion for use in item analysis (Remmers et al., 1965:269) For each test item, the researcher has tabulated the number of students in the upper and lower groups who select each alternative or give each possible response.

Then, the difficulty level of each item is calculated. This is simply the proportion of the testees who answer the item correctly. Applying the item difficulty formula it has been found that the difficulty level ranges from 0.125 to 0.81 (See Table 2). Bloom et al. (1981:95) state that a good spread of results can be obtained if the test items vary in difficulty from 20 to 80 per cent.

Another important factor in item analysis is the computation of the item discrimination power. It is "the difference between good and poor students in proportions of correct responses" (Ebel, 1972:376). It is found that it ranges from 0 to 0.75 (see Table 2). Ebel (ibid.:406) notes that "good classroom test items should have indices of discrimination of 0.30 or more."

As shown in Table 2 there are few items which are weak in their difficulty level or discrimination power – items No. 35,44 and 61. These items are consequently modified to remedy such weakess.

Table 2 The Results of Item Analysis

DL= difficulty level , DP= discrimination power

Items	DL	DP	Items	DL	DP	Items	DL	DP
1	0.81	0.25	26	0.81	0.375	51	0.25	0.5
2	0.625	0.25	27	0.562	0.375	52	0.25	0.5
3	0.375	0.5	28	0.19	0.375	53	0.25	0.5
4	0.625	0.5	29	0.562	0.375	54	0.25	0.375
5	0.687	0.375	30	0.437	0.625	55	0.5	0.375
6	0.75	0.25	31	0.625	0.25	56	0.19	0.375
7	0.81	0.25	32	0.75	0.25	57	0.375	0.75
8	0.75	0.25	33	0.687	0.375	58	0.19	0.375
9	0.19	0.25	34	0.375	0.5	59	0.375	0.5
10	0.687	0.375	35*	0.125	0.00	60	0.25	0.25
11	0.562	0.25	36	0.312	0.625	61*	0.125	0.00
12	0.75	0.375	37	0.375	0.375	62	0.437	0.625
13	0.625	0.25	38	0.5	0.75	63	0.312	0.625
14	0.5	0.5	39	0.75	0.25	64	0.5	0.5
15	0.687	0.375	40	0.25	0.5	65	0.25	0.25
16	0.375	0.5	41	0.19	0.375	66	0.25	0.25
17	0.437	0.625	42	0.25	0.5	67	0.25	0.5
18	0.437	0.25	43	0.25	0.375	68	0.19	0.375
19	0.25	0.375	44*	0.125	0.125	69	0.25	0.5
20	0.375	0.5	45	0.25	0.5	70	0.25	0.5
21	0.437	0.375	46	0.562	0.25	71	0.25	0.5
22	0.437	0.25	47	0.687	0.25			
23	0.437	0.25	48	0.625	0.375			
24	0.5	0.375	49	0.687	0.375			
25	0.375	0.25	50	0.312	0.375			

4.5.2.5 Reliability

The second important characteristic for the evaluation of language tests, next to validity, is reliability, which can be defined as the degree of consistency between two measures of the same thing (Mehrens and Lehmann, 1991: 242, 262). Presumably, "if the same test were given twice to the same group of students, the performance of each student would show little variation" (Valette, 1977:44).

There are several ways of measuring the reliability of tests such as test-retest, split-half, Kuder-Richardson, and equivalent-forms methods. The method used for estimating the reliability of the test of the present study, which provides an index on the internal consistency of the test, is Kuder-Richardson Formula 20 which requires information on the difficulty (proportion of correct responses) of each item in the test. The computed coefficient of reliability is 0.835

Another variation of this method, is Formula 21, which is based on total test scores including the mean and variance of scores (See Ingram, 1978 : 17). The application of this formula yields a 0.701 coefficient of reliability, which is acceptable as Tuckman (1975:257) confirms that "teacher-built tests are usually considered adequate with reliabilities of 0.50 or above."

4.6 Application of the Experiment

After the requirements of the experiment were met and all instruments prepared, the experiment started on November 9, 2001 by administering the pretest. The researcher herself, with long experience in teaching, taught the study subjects. Instruction was given two hours per week in one session. Five units of the prescribed textbook (see 4.5.1 above) were covered during the

experiment. The researcher followed three steps in applying the teaching techniques in each lecture: pre-reading, through reading and post reading. Pre-reading tasks included previewing, presentation of new vocabulary items, discussion and brainstorming. Through reading activities involved silent reading to allow for text processing, note-taking, summarizing and finding the main idea for each paragraph. The final phase, post reading tasks, included various exercises such as question and answer, true-false exercises, finding out the topic sentence. (for more details see 3.10 above).

The researcher did not tell the study subjects that they were participating in an experiment to avoid hawthorn effect, i.e. "the effect that experimentation has on subjects due to their awareness of being specially treated" (Robinson, 1981:114). The experiment lasted for ten weeks and ended with the administration of the posttest.

4.7 Final Administration of the Test

After ensuring the validity and reliability of the test, the researcher administered it to the study subjects on January 23, 2002. The test was administered in two parts. The subjects dealt with comprehension for one hour and a half. Then they had a break for 30 minutes. After that they dealt with vocabulary and syntax for one hour.

The researcher gave clear instructions on how to answer each part of the test (see Appendix 5). The subjects were informed by the Head of the Department that a good score would be taken into consideration in the assessment of the students' class efforts. This was done to motivate them and encourage them to take the test seriously. In addition, proper testing conditions were provided to allow all examinees to perform at their best under

identical conditions, and to avoid any extraneous factor that may interfere as a possible variable in the discrimination of the test.

4.8 The Scoring Scheme

"A good classroom test will probably contain both subjective and objective test items" (Heaton, 1975:13). Test objectivity can be better ensured if an accurate and complete scoring scheme is developed for the whole test (Al-Hamash et al., 1989:23).

Most items of the test are of the kinds: multiple-choice, fill-in-the blanks, matching, short-answer and word formation questions. The scoring of such sets of items is easy since they are objective. Each correct item is given one mark. Any failure to tick the correct choice or to give the model answer is considered a wrong response. As to question and answer, short-answer and completion items, any response which is relevant to the question and its model answer is considered correct and given a full mark regardless of spelling mistakes. Since the test consists of 71 items, its highest score is 71.

4.9 Statistical Tools

The following statistical tools are adopted in the experimental work and in the analysis and interpretation of the test results: -

1- Percentage: to find out the proportions of each type of error revealed in the process of identifying linguistic difficulties via error analysis.

2- Kuder-Richardson Formula 20 to estimate the reliability of the test

$$^{r}KR20 = \left(\frac{n}{n - 1}\right)\left[\frac{Q^2 - \Sigma pq}{Q^2}\right]$$

Where n = the number of items in the test

Q^2 = the variance of test scores

p = the proportion of the subjects answering a given item right

q = 1 – p (Roscoe, 1969:105)

2- Kuder Richards Formula 21 to calculate the reliability of the test

$$^{r}KR21 = \left(\frac{n}{n - 1}\right)\left[\frac{M - (n - M)}{nQ^2}\right]$$

Where M = the mean of the test scores

(ibid.: 112)

3- Difficulty level formula to compute the difficulty level of each item of the test

$$\text{Difficulty} = (R\backslash T)100$$

R = the number of pupils who got the item right

T = the total number of pupils included in the item analysis

(Gronlund, 1976:267)

It can be interpreted as follows:

$$(\text{higher correct answer} + \text{lower correct answer})\backslash 54$$

4- Item discrimination power to calculate the discriminatory power of each test item.

$$\text{Discrimination power} = (R_U - R_L)\backslash 0.5T$$

(Minium et al., 1999 : 280)

R_u = the number of pupils in the upper group who got the item right

R_L = the number of pupils in the lower group who got the item right

0.5T = one half of the total number of pupils included in the item analysis

It can be interpreted as follows:

(Higher correct answers-lower correct answers)\27

5- t-test for two dependent samples to find out the significance of difference between the scores on the pre and post test

$$T = \frac{D}{S_D^-} = \frac{D}{\sqrt{\frac{SS_D}{N(n-1)}}}$$

(Minium et al., 1999 : 280)

where D = the mean of the sample of difference scores.

S_D = the standard error of the difference scores.

SS_D= the sum of squares of the difference scores.

n = the number of subjects

5.1 Introductory Note:

This chapter is devoted to the presentation of results revealed in connection with the aims and hypothesis of the study. These results are obtained by the researcher after a statistical analysis of the data collected after administering the pre – posttests to the study subjects. The findings related to the fourth aim only are introduced here because the first three aims have already been dealt with in the previous chapter. The results are afterwards discussed and interpreted in the light of the theoretical evidence.

5.2 Results:

To verify the fourth aim of the study, i.e. investigating the efficiency of the recommended teaching techniques in improving achievement in RC, through pre and post testing and its null hypothesis stating that there is no statistically significant difference between the mean score of the students' achievement in RC before and after being exposed to the suggested teaching techniques. The two – tailed t – test for two dependent samples is used. The mean score of the pretest scores is 29.4, whereas that of the posttest scores is 48.26. It is found out that the null hypothesis is rejected since the computed t – value (14.026) is greater than the tabulated t – value for 29 degrees of freedom and 0.001 level of significance which is 3.659. This means that the difference between the subjects' scores on the pre – posttest is significant in favour of the posttest (See Table 5 below). In other words, the independent variable in the experiment, i.e. the teaching techniques has turned out to be effective.

Table 5

t – test statistics for testing the difference between the study subjects' scores in the pre – post test of RC

Test	N	X	D	S_D	Df	t-value		Level of significance
						Computed	table	
Pretest	30	29.4	19.033	1.357	29	14.026	3.659	0.001
Posttest		48.26						

Moreover, an elaborate statistical analysis of the students' responses to the sub domains of the pre – posttest is conducted using the above – mentioned t-test to reveal precisely the area in which progress has been attained by these students. The results of this analysis show statistically significant differences between the subjects' scores in the majority of the sub domains of the pre – posttest in favour of the posttest (See Table 6). More specifically, the vocabulary aspect has undergone the most prominent improvement, followed by syntax, morphology, literal RC, inferential RC and style respectively. The critical level of RC only does not indicate a significant difference.

Table 6

t – statistics for testing the differences between the study subjects' scores in the subdomains of the RC pre – post test.

Test subdomains	No. of Items	No. of subjects	D	S_D	Df	t – value		Level of significance
						Computed	table	
Literal RC	5	30	-1.367	0.258	29	-5.298	3.659	0.001
Inferential RC	5	30	-1.4	0.269	29	-5.204	3.659	0.001
Critical RC	1	30	-0.267	0.267	29	-1	2.045	0.05
Vocabulary	28	30	-6.067	0.773	29	-7.849	3.659	0.001
Morphology	5	30	-2.333	0.335	29	-6.964	3.659	0.001
Syntax	22	30	-7.4	1.06	29	-6.981	3.659	0.001
Style	5	30	-0.567	0.213	29	-2.662	2.045	0.05

5.3 Interpretation and Discussion:

As shown earlier in the statistical analysis of results, the teaching techniques suggested and adopted by the researcher in her experiment have proven effective since the achievement of the study subjects has greatly improved in the post test administered at the end of the experiment.

The results also exhibit a remarkable and significant improvement in the students' literal and inferential comprehension of scientific tests, as well as their mastery of the aspects of vocabulary, morphology syntax and style, as follows:

1- The area of language which reflects the greatest improvement is vocabulary. This is regarded as logical and natural as a result of the students' exposure to a number of texts throughout the experiment, as well as the effect of the teaching techniques in increasing the students' vocabulary repertoire and helping them extract meaning from the context and other linguistic clues.

2- The postgraduate students of science have greatly benefited from the teaching techniques in developing their treatment of the syntactic components of their texts. The teaching techniques that draw students' attention to the cohesive devices, tenses, modals and other aspects of syntax that mainly characterize scientific writing have turned out to be very effective and fruitful.

3- The same is true concerning those techniques which give students practice in those dimensions of morphology and word – formation that are most recurrent in ESP courses and which, in their turn, enhance their RC.

4- The postgraduates' literal and inferential levels of comprehension have also witnessed noticeable progress due to the efficacy of the adopted teaching techniques that provide learners with diverse activities that enable them to elicit the main idea and important details, infer meaning from context, understand ideas implicitly stated, and other relevant skills.

5- Some development is also achieved, though to a lesser degree, in the semantic aspects of language concerned with style and expression after the application of the relevant teaching techniques.

6- The insignificant difference found out in the critical level of comprehension, may have been due to the number of items that measure this level (one item only) which does not allow for the appearance of significant differences. Yet, there is an increase in the number of students who answered the item correctly from the pretest to the posttest.

So, in the light of the findings of the study, the researcher has observed that the suggested techniques are very appropriate and influential in providing students with opportunities and activities that improve their understanding and help them develop mastery in RC. In fact, the great value of the teaching techniques is that they give students proficiency in different reading skills such as scanning skimming, inference making.

These positive results can be accounted for in the light of the following points that are referred to and documented in the previous chapters:

(1) Properly developed reading skills help students to better understanding of the scientific texts.

(2) The teaching techniques employed in the present study are adopted by the researcher after a detailed analysis of postgraduate science students' errors which has revealed the major areas of difficulty they suffer from, especially linguistic ones, and has enabled the researcher to tailor her techniques accordingly. This is supported by Brown's (2000:234) statement that "error treatment and focus on language forms appear to be most effective when incorporated into a communicative, learner – centered curriculum".

(3) Reading activities are suggested by the readers' goals and by specific characteristics of the reading passages. Reading tasks must be realistic in terms of both language use and students' abilities.

(4) Appropriately designed teaching techniques enable students to understand information explicitly and implicitly stated, make inferences, formulate the author's ideas in their own words, and thus help them obtain optimum RC.

(5) Gradual practice in certain skills that the teaching techniques provide in the three phases of reading instruction (pre reading, through reading and post reading) motivates the learner and creates better atmosphere for learning.

(6) In other words, in Nelson's (1999:16) expression, teaching should take its time, particularly in a classroom where science literacy is the goal. Among other things, students need time for exploring, testing ideas; time for asking around, reading and arguing; time for wrestling with unfamiliar vocabulary and ideas and for coming to see the advantage in thinking differently.

(7) Consequently, errors in comprehension are more likely to be eradicated if one specific skill is selected and worked upon, rather than attempting to cover the gamut of reader reactions to a number of activities. Such directed concentration has been shown to yield better results than incidental learning from continued exposure to comprehension exercises (Staiger, 1973:49).

(8) Teaching techniques should provide students with exercises that make them respond to the precise meaning of familiar words used from their context and also infer the meaning of unfamiliar words from contextual or internal clues without reference to a dictionary (Bright and McGregor, 1979:56). "This use of context is balanced with other strategies such as analyzing sentence structure for inferring meaning" (Moyle, 1968:43f). This helps students understand meaning of a written text more easily.

(9) As a result teaching techniques make readers possess a large receptive vocabulary and knowledge of syntatic and rhetorical structure which can be exploited to promote their RC.

(10) Teaching techniques should provide students with tasks that enable them to synthesize information and anticipate the author's perspective. Through these processes, students compare textual information with prior knowledge to evaluate texts (Silberstein, 1994:12).

(11) The utilization of teaching activities such as games has turned out to be influential in developing reading skills such as identifying the main idea or the gist of certain paragraphs. This advantageous use of games is supported by Al-Samarra'i (1997).

(12) The techniques help to develop fluent, independent readers who set their own goals and strategies for reading. Students learn aspects of the reading process through reading.

(13) The use of teaching techniques like brainstorming in the pre – reading phase of reading instruction can better improve students' level of RC by allowing them to express themselves freely in class on a topic relating to a reading passage before the reading activity per se. Such implication is supported by Ahmed's (2001) conclusion that brainstorming is stimulating, efficient and productive in improving students' RC.

(14) The suggested techniques stimulate the students and create a real – life activity inside the classroom by initiating discussion, asking students to reproduce part or all of a text, or asking them to find certain things in the text, and thus reading skills can best be developed by comprehension work.

(15) The use of the overhead projector for screening large numbers of passages for only a few moments each, can give students ample practice in scanning, skimming and RC thus overcoming the problem of the limited number of passages available in a textbook, and avoiding a deluge of handouts in class (Garton, 1979:110)

(16) Finally, since RC results from a constellation of many factors, the RC score actually reflects the total behavioural response of the learners to a complex process (Kingston, 1970:233). Hence, the increase of the learners' RC scores after the experiment reflects an improvement in those learners' response and attitude toward the reading process.

6.1 Conclusions:

The conclusions below are drawn in the light of the study results and the researcher's own observations throughout her investigation:

1- Extensive training and practice in teaching techniques that have proven effective enhance students' RC.

2- Teaching techniques that are tailored to remedy certain linguistic difficulties encountered by students have stronger impact on their RC.

3- Students of science benefit from training in teaching techniques for better RC.

4- Analysis of students' errors in RC tests is important to reveal the areas of difficulties they suffer from and to choose or design relevant teaching techniques accordingly.

5- Teaching techniques properly selected and applied develop in the students a conscious awareness of the ways in which the language system is used to express scientific facts and concepts, so that control is gained whether over language, rhetorical structure or communication skills.

6- Learning science is not merely a matter of learning facts, but of learning how language is used to give expression to certain reasoning processes.

7- Investing appropriate teaching techniques helps draw science students' attention to the significance and utility of not only comprehension of specialized scientific terminology, but also adequate mastery of language structures for better understanding of their scientific texts.

8- Creating a relaxed environment is necessary to develop and maintain in the students a favourable attitude to the reading materials provided by presenting a large amount of choice and selecting materials which are likely to reflect the learners' spontaneous interests.

9- The load on teachers can be reduced when certain techniques, such as the four 'I's , are used in which the teachers see themselves as responsible only for answering what the class as a whole cannot solve.

10- Reading skills, especially those of inferential and critical reading can be developed and improved through training.

11- Readers should be made aware of what syntax, lexis and idiomatic implications contribute to the full understanding of a printed message.

12- Pre – reading instruction in facilitator, previewing and prediction skills speeds up or eases the reading acquisition process.

13- The overhead projector is an effective teaching aid for classroom practice in reading skills.

14- Activities that teach summarizing, questioning, clarifying and predicting skills, enhance comprehension and at the same time give the student the opportunity to monitor whether comprehension is succeeding.

15- The application of suitable teaching techniques widens the students vocabulary repertoire and thus promotes their RC.

16- Training in proper reading techniques and activities increases science students' sensitivity to those devices of syntax and morphology that characterize scientific writing as an important step towards more efficient RC.

6.2 Pedagogical Recommendations

In the light of the findings above which prove the effectiveness of the suggested teaching techniques in improving science students' RC. The following recommendations are made to promote and enhance reading instruction in general and ESP reading instruction in particular. These recommendations are grouped into the following sections according to the element of the teaching process involved.

6.2.1 The Teacher:

1- Teachers should be familiarized with effective and useful techniques through special inservice training programmes.
2- Teachers should be encouraged to use these teaching techniques in their classrooms to help students improve their RC.
3- Teachers need to be provided with references and periodicals that keeps them up to date them with modern teaching techniques and recent development in the field of teaching RC.
4- Teachers should be advised to use teaching aids such as overhead projectors, computers, charts in their classrooms to enhance their students' mastery of reading skills and increase their interest and motivation.
5- Teachers should perceive the importance of emphasizing the linguistic properties of scientific texts to achieve optimal understanding of such texts.
6- Teachers should do their best to organize and manage the instructional environment in the way that serves to maximize students' engagement in their academic studies.
7- Teachers should pay attention to the importance of implementing careful and continuous evaluation of student progress in RC.

6.2.2 ESP Course Designers:

1- ESP textbooks should be designed to meet the needs of ESP learners in their various specializations.
2- Analysis and identification of errors ESP students make, such as the one conducted in this study, is to be taken in consideration when designing ESP courses.
3- Texts selected to be included in ESP textbooks should be authentic, i.e. exhibit the characteristics of true discourse: having something to say, being coherent, and clearly organized.

4- ESP courses should be enriched with activities and tasks that give ample practice in diverse reading skills.

5- Students' motivation and positive attitude towards learning effective RC skills must be catered for and enhanced by connecting these skills to their interests and needs.

6.2.3 The Students:

1- Students should expose themselves to extensive and gradual practice in a wide range of effective reading skills and activities. Practice in these activities should form the backbone of any careful reading programme.

2- Students should trained themselves to pay close attention to language, particularly syntax, cohesive devices and discourse markers, in order to interpret difficult texts.

6.3 Suggestions for Further Research:

On the basis of the findings of the present study, and as a continuation of it, it is suggested that further studies are conducted to:

1- investigate the effect of experimenting with the teaching techniques adopted in this study in academic studies other than the scientific section in order to get a comprehensive view of the field.

2- extend the experiment to involve lower levels of ESP studies, the undergraduate level, for instance, both scientific and others to evaluate the efficiency of these techniques and in order to get a more comprehensive picture of the field.

3- examine the effect of the interaction of certain variables such as sex, IQ, memory, language ability, etc. with students' reading achievement.

4- examine the effect of designing and applying a comprehensive reading instructional programme on improving students' RC.

5- suggest teaching techniques for overcoming difficulties that ESP students encounter in their writing and examine the effect of applying such techniques.

-Appendix (6)

A Typical lesson Plan

Class: Diploma Students / Building and Construction Department

Date: November

Time: 100 minutes

Material: Unit three (Characteristics of Computers) (See Appendix 7 below)

Objectives:

A- Special Objectives:

1- Improving students' mastery of certain skills of RC.

2- Introducing certain cohesive devices and structure words.

3- Enabling the students to identify certain rhetorical patterns.

B- Behavioural Objectives:

At the end of this lecture, diploma students will be able to:

1- distinguish between main ideas, major and minor details.

2- identify the meaning and use of cohesive devices and structure words such as anaphoric references, although, therefore, moreover, for example, but, it goes without saying.

3- recognize and use rhetorical patterns such as definition, comparison and contrast, process.

Teaching Techniques and activities:

A- **Pre-reading activities:** (time: 30 minutes)

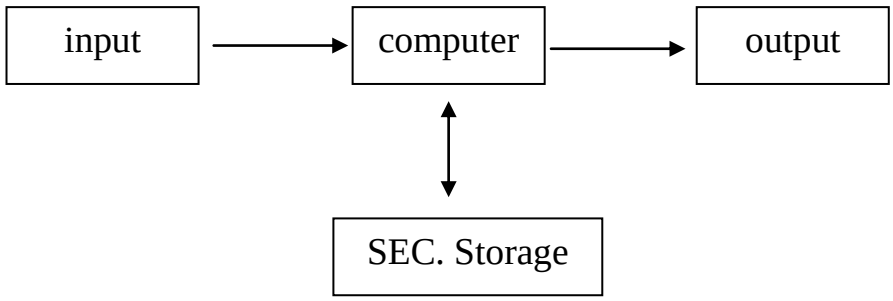
These include brainstorming, class discussion, anticipating content all of which is done through questions such as:

1- What are the characteristics of computers?

2- What are the main components of computers?

3- What is the difference between old computers and modern ones?

a- Previewing: The instructor here asks the students to think about the title. Then she writes the new terms and expressions on the board. She also displays a diagram which is closely related to the topic of the unit on the overhead projector.



b- Prediction: Utilizing the previous activities, the mstructor leads her students to making intelligent guesses about the text to anticipate its main content, to make hypotheses that will be confirmed or rejected later during the actual reading.

B- **While reading activities:** (time: 30 minutes)

The instructor reads the passage aloud first. Then she ask the students to read it silently, giving them sufficient time to engage in the following activities:

a- Self-questioning: in this phase the students are encouraged to use the SQ3R or the KWL technique, to draw semantic maps or to take notes summarizing the important ideas of the passage. The instructor here provides them with a table that facilitates this note-taking.

They are also asked to do an exercise that enables them to understand words from context or provide their synonyms or antonyms.

b- Self-monitoring: Through pair work and group work, the students monitor their comprehension of the passage by exchanging information among them and checking their understanding of new terms (which is attempted in the previous stage). The instructor also uses games to involve students in useful and interesting interaction. One of these games asks them to distinguish between main ideas, major and minor details.

C- **Postreading activities:** (time: 40 minutes)

In this stage the instructor asks the students to do a variety of exercises and tasks through which she evaluates their comprehension, makes them interact more with the text, and asks them questions of evaluation.

These exercises include:

1- finding out the topic sentence of each paragraph
2- comprehension items in the form of true – false.
3- manipulating contextual reference by identifying anaphoric relation.
4- identifying cohesive devices and structure words such as: although, therefore, moreover, for example, but, it goes without saying.
5- identifying and eliciting certain rhetorical patterns from the passage such as definitions, process, comparison and contrast.
6- morphological items in which the students are asked to choose the appropriate form of certain words to complete sentences.
7- tasks on vocabulary treatment which include synonyms, antonyms, affixes.
8- a jigsaw task in which the students are asked to rearrange certain ideas that are out of order so as to make a meaningful paragraph.

All the above – mentioned activities are performed under the umbrella of the "four Is" techniques: involvement, interaction, individualization and independence.

4- **Teaching Aids:**

Blackboard and over head projector.

Bibliography

- Ahmed, M. M. S. (2001) "The Effect of Brainstorming On Teaching Reading Comprehension in English to University Students." Unpublished Ph. D. Dissertation College of Education, University of Baghdad.
- Akmajian, Adrian, Richard A. Demers, Ann K. Farmer and Robert M. Harnish (1997) **Linguistics**. Cambridge: The MIT Press.
- Alderson, J. Charles, Caroline Clapham and Dianne Wall, (1999) **Language Test Construction and Evaluation** Cambridge: Cambridge University Press
- Allen, E. David and Rebecca M. Valette (1977) **Classroom Techniques: Foreign Languages and English as a second Language.** New York: Harcourt Brace Jovanovich, lnc.
- Allen, P. B. and H. G. Widdowson (1985) "Teaching The Communicative Use of English" in **Episodes in ESP** by John Swales, Oxford: Pergamon lnstitute of English,
- Allen, Robert L. (1964) "Better Reading Through the Recognition of Grammar Relationships" **The Reading Teacher** Vol. 18, No.3, pp. 194-196.
- Beck, I. (1981) 'Reading Problems and Instructional Practice'. **Reading Research Quarterly,** vol. 2, pp. 53-95

- Bhatia, Aban T. (1979) **"**ESP for Students of Science" **English Teaching Forum** vol. 17, No. 2 pp. 24-27
- Bloom, B. S., G. F. Madaus and J. T. Hastings. (1981) **Evaluation to Improve Learning.** New York: McGraw – Hill. Inc.
- Blue, G. (1981) **The ESP Teacher: Role, Development and Prospects EIT Documents 112**. London.
- Bright, J. A. and G. P. McGregor. (1970) **Teaching English as a Second language.** London: Longman.
- Brown, H. Douglas (2000) **Principles of language learning and Teaching,** 4th ed. New York: Addison Wesley longman, Inc.
- Carver, David (1978) "Reading Comprehension: Is There Such a Thing?" **ELT Journal** Vol. 32 No. 4, pp. 291-297
- Chapman, John (1984) "Comprehending and the Teacher of Read" In **Promoting Reading Comprehension,** edited by James Flood.
- Chritensen, Larry B. (1980) **Experimental Methodology**, 2nd ed. Boston: Allyn and Bacon. Inc.
- Clark, Margaret M. 1976 "Language and Reading: Research Trends" in **Problems of Language and Learning** editied by: Alan Davies, London: Heinemann Educational Books Itd. pp. 89-112.
- Clymer, Theodor. (1972). "What is 'Reading'? Some Current Concepts". In **Reading: Today and Tomorrow,** edited by A. Melnik and J. Merritt. London: University of London Press Limited.

- Cohen, A., H., Glasman, P.Rosenbaum – Cohen, J. Ferrara, and J. Fine (1998). "Reading English for Specialized Purposes: Discourse Analysis and the Use of Student Informants". In **Interactive Approaches to Second Language Reading,** editied by P. L. Carrell, J. Devine and D. E. Eskey. Cambridge: Cambridge University Press, pp. 152-167.
- Corder, S. Pit (1981) **Error Analysis and Interlanguage.** Oxford: Oxford University Press.
- Crystal, David (1997) **The Cambridge Encyclopedia of Language,** 2nd ed. Cambridge University Press.
- D'Arcangelo, Marcia. (1999). "Learning About Learning to Read: A Conversation with Sally Shaywitz." **Eaucational Leadership,** vol. 57, pp. 26-31.
- Darwesh, Ab'dul-Jabbar A. (1999) "Assessment of Information Gain in Reading Comprehension Tests: A validity Index." Unpublished Ph.D. Dissertation, College of Education, University of Baghdad.
- Darwesh, Ab'dul-Jabbar A. and Faris Al Jarah (1987) **An Elementary Course in Testing English as a Foreign Language.** Baghdad: Ministry of Education. Printing House, No. 1
- Dlugosz, D. W. (2000) "Rethinking The Role of Reading in Teaching a Foreign Language to Young Learners" **ELT Journal** Vol. 54, No. 3, pp. 284-290.
- Dresdner, Mauricio Pilleux (1975), "Teaching Scientific English" **English Teaching Forum: The Art of TESOL,** No. 3, Vol. 13, pp. 243-246.

- Dudley-Evans, Tony, and Maggie Jo St John (2000) **Developments in English For Specific Purposes** Cambridge: Cambridge University Press.
- Ebel, Robert I. (1972) **Essentials of Educational Measurement.** Englewood Cliffs, N. J.: Prentice Hall, Inc.
- Ellis, Rod (1994) **The Study Of Second Language Acquisition** 7th impression, Oxford: Oxford University Press.
- Eskey, David E. (1975) "Advanced Reading: The Structural Problem", **English Teaching Forum: The Art of TESOL** Vol. 13, No. 3 pp. 210-215.
- Finch, Geoffrey (2000). **Linguistic Terms and Concepts.** London: Macmillan Press Ltd.
- Fry, Edward B. (1972) **Reading Instruction For Classroom and Clinic**, New York: McGraw – Hill Book company, Inc.
- Garton, James. (1979) "Improving Reading Skills with the Aid of the Overhead projector" **ELT Journal,** Vol. 33 No. 2 pp.
- Gipps, Caroline V. (1995) **Beyond Testing: Towards a Theory of Educational Assessment.** London: The Falmer Press.
- Glendinning, H. and Beverly Halmström (1998) **Study Reading: A course in Reading Stills for Academic Purposes.** Cambridge: Cambridge University Press.
- Good, Carter V. (1973) **Dictionary of Education,** 3rd ed. New York: McGraw – Hill Book Company, Inc.

- Goodman, Kenneth S. (1970) "Reading: A Psycholinguistic Guessing Game". In **Theoretical Models and Processes of Reading,** edited by Harry Singer and Robert Ruddle. Newark, Delaware: International Reading Association.
- Grellet, FranCoise (2002) **Developing Reading Skills**, 21st printing Cambridge: Cambridge University Press.
- Gronlund, Norman E. (1976) **Measurement and Evaluation in Teaching,** 3rd ed. New York: Macmillam Publishing Co.,Inc.
- Guthrie, John (1976) **Aspects of Reading Acquisition** Baltimore and London: The John Hopkins University Press.
- Halliday, M. A. K, Angus McIntosh and Peter Strevens (1964) **The Linguistic Sciences And Language Teaching**. London: Longmans.
- Al-Hamash, Khalil I. (1977) "The Administrative Aspects of ESP Program Development" Unpublished Paper; Baghdad.
- Al-Hamash, Khalil I., A. J. Al-Jubouri, and W. M. Al-Hiti (1989) **Testing Guide for Primary and Intermediate Teachers of English in Iraq**. 5th revised ed. Arbeel: Ministry of Education. Press/2
- Harris, David, (1969) **Testing English as a Second Language**. New York: McGraw-Hill.
- Harris, Theodore (1969) 'Reading' In **Encyclopedia of Educational Research,** 4th ed. Edited by Robert Ebel. London: The Macmillan Company.

- Harris, T. L. and R. L. Hodges. (1982) **A Dictionary of Reading and Related Terms.** Newark: Delware.
- Heaton, J. (1975) **Writing English Language Tests**. London: Longman.
- Holloway, H. John (1999) "Improving the Reading Skills of Adolescents" **Educational Leadership,** vol. 57, No. 2, pp. 80-81.
- Huckin, Thomas N. and Leslie A. Olsen (1991) **Technical Writing and Professional Communication for Nonnative Speakers of English.** International edition. New York: MacGraw – Hill,Inc.
- Huckin, Thomas N. and Leslie A. Olsen (1991) **Instructor's Manual to Accompany Technical Writing and Professional Communication** 2nd ed. McGraw – Hill, Inc.
- Hutchinson, Tom and Allan Waters (1987) **English for Specific Purposes: A Learning Centered Approach** Cambridge: Cambridge University Press.
- Ingram, Elisabeth. (1978)"Testing and Language Learning". In **Testing and Experimental Methods,** Vol. 4, editied by Alan and Davies. Oxford: Oxford University Press.
- Isaac, S. and W. B. Michael (1977) **Handbook in Research and Evaluation**, 8th Printing. New York: Robert R. Knapp
- Ives, Summer (1964) "Some Notes on Syntax and Meaning" **The Reading Teacher,** Vol. 18, No. 3 pp. 179-183.

- Al-Janaby, S. A. M. (1998) **A Survey of the Techniques Used in Teaching RC in Intermediate Schools**. Unpublished M. A. Thesis, University of Baghdad.
- Jenkinson, Marion D. (1973) "Ways of Teaching" In **The teaching of Reading**, edited by Ralph C. Staiger. Paris: UNESCO and Ginn and Company pp. 39-60
- Jordan, R. R. (2001). **Academic Writing Course**: **Study Skills in English.** 3rd ed. London: Longman
- Al-Jubouri, A. (1979) "General Features of English for Science and Technology" **IDELTI,** No. 13, pp. 123-159
- Kennedy, Text Chris and Rod Bolitho, (1984) **English For Specific Purposes** London and Basingstoke: macmillan publishers LTD.
- Al-Khataybeh, Majid M. (1996) **An Analysis of Jordanian University Students' Error in Written English Expression With a Suggested Guide for Remedy**. Un puplished Dissertation, Al-Mustansiriyah University.
- Kingston, JR. Albert. (1970) "The Measurement of Reading Comprehension" In **Measurement and Evaluation of Reading,** edited by Farr, Roger. New York: Harcourt, Brace and World, Inc. pp. 230-236.
- Kobayashi, Yuko (1975) "A new look at Reading in the College Program" **English Teaching Forum,** Vol.13, No. 3, pp. 188-195

- Krashen, S. D. and T. D. Terrel, (1983) **The Natural Approach**. Oxford: Pergamon press.
- Al-Kubaisy, A. B. (1993) "Reading Strategies Used by Iraqi College Students of English As a Foreign Language" Unpublished Ph.D. Dissertation, University of Baghdad.
- LaBerge, David and S. Jay Samuels (1977) (editors) **Basic Processes In Reading: Perception and Comprehension**., Hills dale, New Jersey: University of Minnesota Lawrence Erlbaum Associates, Inc.
- Lackstrom, John E., Larry Slinker and Louis P. Trimble (1975) "Grammar and Technical English" **English Teaching Forum: The Art of TESOL** No. 3, Vol. 13, pp. 250-260.
- Mackay, R. and A. J. Mountford. (1978) **English for Specific Purposes.** London: Longman
- McCallister, James. (1964) "Using Paragraph Clues as Aids to Understandings" **Journal Of Reading,** Vol. 8, **No. 1** pp.11-16.
- McDonough, Jo. (1984), **ESP in Perspective A Practical Guide**. London and Glasgaw Collins Educational.
- Al-Marsumi, I. H. (1994) "The Effect of Cloze Procedure as a Teaching Technique on Developing Reading Comprehension at University Level." Unpublished Ph.D. Dissertation, University of Baghdad.

- McKeown, pamela. (1974) **Reading: A Basic Guide for Parents and Teachers**. London: Routledge and Kegan Paul Ltd.
- Mehrens, W. A. and I. J. Iehmann. (1991) **Measurement and Evaluation in Education and Psychology,** 4th ed. New York: Holt Rinehart and Winston, Inc.
- Meyers, L. S. and N. E. Grossen. (1978) **Behavioural Research: Theory Procedure and Design,** 2nd ed. Chicago: San Francisco: W. H. Freemans and Company
- Minium, E. W., R. Clarke and T. Coladarci (1999). **Elements of Statistical Reasoning**, 2nd ed. New York: John Wiley and Sons.
- Moyle, D. (1968) **The Teaching of Reading**. London: Ward Lock Educational.
- Mullen, Norma D. and P. Brown. (1987) **English for Computer Science**, Oxford: Oxford University Press.
- Munby, John. (1978) **Communicative Syllabus Design**, Cambridge: Cambridge University Press.
- Nelson, George D. (1999) "Science literacy for All in The 21st Century" **Educational Leadership,** Vol. 57, No. 2 pp. 14-17.
- Newton, J. Roy. (1960). **Reading in Your School.** New York: McGraw – Hill Book Company, Inc.
- Norris, W. E. (1975) "Advanced Reading Goals, Techniques, Procedures" **English Teaching Forum: The Art of TESOL,** Vol. 13 No. 3, pp. 201-209.

- Nuttall, C. (1987) **Teaching Reading Skills in a Foreign Language,** London: Heinemann.
- Nyns, Roland. (1988) "Using the Computer to Teach Reading Comprehension Skill" **ELT Journal,** Vol. 42, No. 4, pp. 253-261.
- Page, T. G., J. B. Thomas, and A. R. Marshall. (1980) **International Dictionary of Education**. Cambridge: The MIT press.
- Pearson, P. D. and L. Fielding. (1991) "Comprehension instruction". In **Handbook of Reading Research, Vol. II,** edited by R. Barr et al., New York: Longman, pp. 815-60.
- Al-Qaraghooly, Dhuha A. (2001) **Designing and Applying A Programme to Develop Note-Taking As one of the Study Skills of EFL College Students**. Unpublished Dissertation.
- Remmers, H. H., N. L. Gage, and J. F Rummel. (1965) **A practical Introduction to Measurement and Evaluation,** 2nd ed. New York: Harper and Row Publishers.
- Richards, J. C. (1974) "A Non-Contrastive Approach to Error Analysis". In **Error Analysis,** edited by J. C. Richards. London: Longman, pp. 172-188.
- Rivers, Wilga M. (1981) **Teaching Foreign – language Skills** 2nd ed. Chicago and London: The University of Chicago Press.

- Rivers, Wilga M. (1988) **Communicating Naturally in a Second Language Theory and Practice in Language Teaching.** Cambridge: Cambridge University Press.
- Robinson, Paul W. (1981) **Fundamentals of Experimental Psychology**. 2nd ed. Englewood Cliffs, N. J.: prentice Hall, Inc.
- Robinson, P. (1991). ESP Today: **a practitioner's Guide** Hemel Hempstead: Prentice – Hall International.
- Roscoe, John T. (1969) **Fundamental Research Statistics (for the Behavioral Science.)**. New York: Holt Rinehart and Winston, Inc.
- AL-Samarra'i, Intisar I. (1997) **Teachers' Attitudes towards Preparing and Using Language Games in TEFL in Intermediate and Secondary Schools in Baghdad.** Unpublished M. A. Thesis, University of Baghdad.
- Seaton, Brian. (1982), **A Handbook of English Language Teaching Terms and Practice,** London: Macmillan Press.
- Sebrank, P., Dave Kemper and Verne Meyer (1999) **Write Source 2000.** Massachusetts: Great Source Education Group, Inc.
- Shams EL. Dean, E. J. (1985) **A Course in English for Engineering and Science Students.** Ministry of Higher Education and Scientific Research. University of Technology
- Shepherd, L. (1973) **Comprehensive High School Reading Methods**. Columbus, Ohio: Bell and Howell Company.

- Silberstein, Sandra. (1994) **Techniques and Resources in Teaching Reading**, Oxford University Press.
- Smith Frank. (1971) **Understanding Reading A Psycholinguistic Analysis of Reading and Learning to Read.** New York: Holt, Rinehart and Winston, Inc.
- Smith, Nila Banton. (1963) "Levels of Discussion in Reading" in **Reading on Reading Instruction** edited by Albert J. Harris, New York: David McKay Company Inc., pp. 285-289.
- Sonka, Amy L. (1979) "Reading Has to Be Taught Too". **ELT Forum,** Vol. 18, No. 1, pp. 2-6.
- Staiger, Ralph C. (1973) "Looking for Better Ways to Teach Reading". In **The Teaching of Reading,** edited by Ralph C. Staiger. Paris: UNESCO and Ginn and Company.
- Strang, Ruth (1972) " The nature of reading " in **Reading : Today and Tomorrow**; edited by Melnik, Amelia and John Merritt. London: University of London Press Limted.
- Strevens, Peter. (1977) **New Orientation in the teaching of English**. Oxford: Oxford University Press.
- Thonis, Eleanor W. (1970) **Teaching Reading to Non – English Speakers,** London: Collier-Macmillan Company limited.
- Tuckman, Bruce W. (1975) **Measuring Educational Outcomes: Fundmentals of Testing**. New York: Harcourt Brace Jovanovich, Inc.

- Urquhart, Sandy and Cyril Weir. (1998) **Reading in a Second language process, Product and Practice,** London: Longman.
- Valette, R. (1977). **Modern language Tests** 2nd ed., New York: Harcourt, Brace, Jovanovich.
- Wallace, Catheren. (1997) "Reading with a Suspicious Eye": Critical Reading in the Foreign Language Classroom". In **Principle and Practice in Applied Linguistics,** edited by Guy Cook and Barbara Scidlhofer. Oxford: Oxford University Press.
- White, R. V. (1978). "Teaching the passive" **ELT Journal** Vol. 32, No. 3, pp. 188-193.
- Widdowson, H. G. (1979) **Explorations in Applied Linguistics,** Oxford: Oxford University Press.
- Widdowson, H. G. (1998) **Linguistics,** Oxford: Oxford University Press.
- Widdowson, H. G. (1999) **Aspects of Language Teaching,** Oxford: Oxford University Press.
- Widdowson, H. G. (2000) **Teaching Language As Communication,** Oxford: Oxford University Press.
- Wilkins, D. A. (1972) **Linguistics In Language Teaching,** London: Edward Arnold.
- Wilkins, D. A. (1976) **Notional Syllabuses.** Oxford: Oxford University Press.
- Williams, Ray. (1986) " 'Top Ten' Principles for Teaching Reading." **ELT Journal,** Vol. 40, No. 1, pp. 42-45.

- Williams, M. and R. I. Burden (1997) **Psychology for Language Teachers: A Social Constructivist Approach,** Cambridge: Cambridge University Press.
- Worden, E. (2000) **Study Skills: A Guide to Better Grades and Real learning.** ICPAC: Indiana Career and Postsecondary Advancement center.
- Yin, Koh Moy. (1988) "ESP for Engineers: a Reassessment" **ELT Journal,** Vol. 42, No. 2, pp. 102-108.