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Implementing General English Reading Courses in Teaching English for Science and Technology to Promote the Reading Proficiency of Students of Electronics, University of Constantine

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Dedication

This work is dedicated to:

My lovely parents: my tender mother and caring father

My husband Mohamed and my little angel Djoud

My sweetheart sister: Chahinez

My dear brothers: Ramzi and Houssem

My adorable aunt Zakia, my dearies Sameh & Houda

My very special friend *MERIEM*

My mother in-law Rachida and sister in-law Radia

All my cousins

My family without exception and all my friends

and

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Abstract

The present study was conducted in the Department of Electronics at the University of Constantine 1 to improve the reading comprehension of Master One students of Electronics of the scientific and technical texts and to overcome their reading comprehension problems, particularly the language-centred ones. It aims at answering questions about the efficiency of equipping learners with the basic discoursal elements in boosting their comprehension. To probe into the subject, three hypotheses were set: *1)* if the teaching of English to Master One students of Electronics is basically reading-oriented, learning will be more interesting and motivating, *2)* if Master One students of Electronics are familiar enough in General English, they will easily handle and understand English for Science and Technology texts, and *3)* if the teaching of reading to Master One students of Electronics focuses on equipping these learners to identify and make use of the non-technical vocabulary and the grammatical-rhetorical relationships per se, their reading comprehension will be enhanced. To check the stated hypotheses, a questionnaire, two proficiency tests, four comprehension tests together with classroom observation were used as data gathering tools within an experimental design. The data obtained offered a clear picture of the teaching/ learning situation of English at the Department of Electronics as well as the learners' needs. The findings of the study have allowed us to see the influence of the students' poor linguistic knowledge on their reading comprehension achievements. Accordingly, we can say that our hypotheses have been to a large extent confirmed. The obtained results evenly highlighted the significance of the implemented course in enhancing the students' reading performance and increasing their motivation and interest in learning English at the department of Electronics and by extension even in the other departments.

List of Abbreviations and Coding Conventions

CIM: Construction Integration Model

Ctrl: Control Group

EFL**:** English as a Foreign Language

ELT**:** English Language Teaching

ESP**:** English for Specific Purposes

EST**:** English for Science and Technology

Exp: Experimental Group

FL**:** Foreign Language

GE: General English

L1: First Language

L2: Second Language

Nbr: Number

MCQ: Multiple Choice Question

Mn: Minute

TALO: Texts as Linguistic Objects

TAVI: Texts as Vehicle for Information

TEFL: Teaching English as a Foreign Language

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Introduction

1. Statement of the Problem

At the University of Constantine 1, English - in most science institutions- is not the medium of instruction nor of communication, it is, simply, taught as a compulsory module at a rate of one session per week. In such EFL (English as Foreign Language) contexts, English texts remain the main source of language input for the learners. In accordance with this, reading comprehension appears to be the most important skill which is believed to have a central role not only in learning new scientific and technical information, but also in learning language. Subsequently, introducing courses whose specific objective is the reading of scientific and technical texts is necessary in all science and technology institutions.

However, in the Department of Electronics, like many other departments in the university, this important skill is completely ignored because English is generally taught by teachers who received no pedagogical training in teaching English for scientific and technological purposes. Furthermore, there is no official determined programme (syllabus), worse the unawareness of students' needs. Language teachers often find themselves obliged to rely on their own experience of teaching English for general purposes to teach EST (English for science and technology) classes. At this juncture, these teachers have to create their own teaching materials with respect to the students' discipline, but never according to the learners' needs because of their ignorance of importance of the specific needs of the learners in EST course design . Consequently, most of the students finish their studies without any sound benefit from the courses given.

For ease of exposition, the pronoun 'he' will be used throughout this dissertation.

To address this issue, it is important to shed some light on the gap that exists in teaching EST between the learners' perceived needs, wants and level. To read efficiently, learners should be equipped with the needed linguistic knowledge; concurrently their reading ability expands on their linguistic competence. In other words, foreign language reading is directly related to the readers' proficiency in the language as texts assigned in academic content-courses which require a high level of linguistic proficiency and presuppose an extensive background knowledge. However, most of the Algerian science students, suffer from a linguistic handicap in English which causes them many problems when they read in their reading field of specialty. Likewise, without solid linguistic proficiency, FL readers cannot perform the task of reading successfully.

In response to this problem, our study proposes a sample of courses that aim at filing in the gap that exists in the teaching-learning of English as a foreign language between the learners' present level and the level needed in the target situation (EST level). The participants were Master One students of Electronics who are supposed to write, in the subsequent year, a couple of reports in English and a dissertation in their field of study using references in English. They have studied English as a foreign language for six (06) years: two (02) years at the elementary school, three (03) years at the secondary school, and one (01) year at the university. Their motivation to improve their level in English and to know more about learning reading in English was an important point for carrying out the experiment.

To achieve such an objective, we have implemented a reading course adopting a coupled approach to reading; reading for language and reading for meaning. This course emphasises building up students' knowledge of rhetorical structures and improving their knowledge of technical vocabulary, non-technical vocabulary in particular. For the

latter, it seems to create real troubles to learners in understanding the technical texts of their field of study to extract information and we will detail it in the subsequent chapters.

2. Aims of the Study

The main objective of this research is to enable Master One students, the subjects of our population, to use their acquired linguistic knowledge in reading and understanding scientific and technical texts effectively. It attempts to provide a comprehensive view of the current situation of the teaching/ learning of English at the Department of Electronics addressing two main issues; the importance of the reading skill in learning a foreign language, and the students' linguistic handicap in English. In tackling these issues, this investigation aims at:

- ✓ Exploring the learners' needs in terms of language skills and tasks, learners' preferred approach to learning English and teachers' roles.
- ✓ Eliciting the reading needs, attitudes, and difficulties and deficiencies of the subjects in English.
- ✓ Repairing, activating and extending the students' linguistic knowledge.
- ✓ Improving the students' reading comprehension of EST texts.
- ✓ Testing the effectiveness of the implemented reading courses.

3. Research Questions and Hypotheses

For investigating the aforementioned issues, we put the following questions:

1. What are the learners' needs in learning English as a FL?
2. What are the learners' difficulties and problems in reading comprehension?
3. Do GE grammatical structures and non-technical words impair students' comprehension?
4. What is the importance of knowing the rhetorical organisation of EST texts in reading comprehension?

5. What is the importance of re-orienting the teaching of GE/EST vis-à-vis the teaching of English in the present situation, at the Department of Electronics to make it more interesting and beneficial?

6. Does reading –oriented teaching that focuses on discoursal elements of scientific texts enhance the students' reading comprehension?

To provide answers to the above questions, the subsequent hypotheses are set in the following order:

Hypothesis One

If the teaching of English to Master One students of Electronics is basically reading-oriented, learning will be more interesting and motivating.

Hypothesis Two

If Master One students of Electronics are fluent enough in GE, they will easily handle and understand EST texts.

Hypothesis Three

If the teaching of reading to Master One students of Electronics focuses on equipping these learners to identify and make use of the discourse features of EST texts, including the non-technical vocabulary and the grammatical-rhetorical relationships per se, their reading comprehension will be enhanced.

4. Tools of Research

In order to test the effectiveness of our implementation, we opted for the experimental research and three instruments of investigation are used for data collection. The first tool is the questionnaire addressed to 58 Master One students of Electronics, at the University of Constantine1. The aim of the questionnaire is to provide insights into the learners' language needs with a special focus on the reading skill.

The second tool used is the test. Two types of tests are used; proficiency (linguistic tests) and comprehension tests. Two proficiency tests were implemented at the beginning of every unit to assess students' knowledge of language that will be introduced in the unit, and they are referred to as 'Entry Test 01' and 'Entry Test 02'. They aim at assessing the subjects' linguistic knowledge about some grammatical structures, rhetorical function and non-technical and general vocabulary words. Each test is made up of three exercises that cover the three aspects mentioned earlier.

Besides, four comprehension tests organised in an observation grid, pre-test, post-test 1, post-test 2, and post-test 3, were administered to assess the students' comprehension *before*, *during* and *after* the treatment period. These tests consist of a reading passage along with five activities (comprehension questions).

5. Structure of the Dissertation

The dissertation is presented in five chapters. The first three chapters are devoted to the theoretical aspects underlying our topic of investigation. The last two chapters are reserved for presenting the research methodology, the design and implementation of the experiment, and the quantitative and qualitative evaluation of the obtained results followed by pedagogical implications.

Chapter One attempts to describe the nature of the reading skill in a foreign language through reviewing and discussing the variables affecting the reading skill; the reader variables and the text variables. In addition, it offers an overview on the reading models, the reading modes, and reading strategies. Furthermore, it tries to highlight the importance of reading for foreign language learners.

In chapter Two, we try to review the approaches of teaching reading in FL drawing clear pictures of their advantages and drawbacks. The chapter also attempts to explore the different approaches to designing reading courses and discusses the aspects

underlying the selection of the reading materials and the classroom activities. In addition, it offers a whole section assessing reading which sheds some light on the different types of assessments along with the various types of comprehension questions.

Chapter Three attempts to present the theoretical background related to teaching EST, focusing on GE vs. EST dilemma in English teaching at the tertiary level. Besides, it tries to provide a discussion of the discoursal devices with a major focus on vocabulary and the rhetorical functions that affect the reading skill in EST.

Chapter Four introduces a detailed description of the research methodology, population, sampling, instrumentation and procedure employed in the study to meet the research aims, objectives and requirements. It also describes the experimental design, the implementation of the experiment, and presents the framework chosen for analysing the data with a brief discussion on the possible ways in interpreting the results obtained.

Chapter Five comprises the interpretation and the discussion of the obtained results of the students' questionnaire, proficiency tests, comprehension tests and the researcher's observations. It also tries to provide answers for the set hypotheses apart from the obtained results.

Chapter One

The Nature of the Reading Skill in a Foreign Language

Chapter One

The Nature of the Reading Skill in a Foreign Language

Introduction

Reading is a fundamental skill in language learning as a means for getting information on both language and the world. It is proved to be the most important skill, thus, it has been studied across different disciplines and explored in English as First Language (L1), Second Language (L2) and Foreign Language (FL) and the vast literature is the best illustration.

This chapter explores the different aspects of the reading skill and its nature in a FL learning context, looking at the various definitions suggested in the literature in an attempt to understand this skill. It tries to give a wealth and a comprehensive answer to *what reading is* which helps us look at both sides of the coin; i.e., the reading process and the reading product. Furthermore, it tries to shed some light on the variables affecting the reading skill in a FL with a discussion of both the readers' variables and the text variables. In addition, it attempts to present an overview of the reading models for complex processing along with the strategies readers employ while reading. Then, it introduces both modes in which reading is done whether inside or outside the classroom. Finally, it highlights the importance of reading in a FL.

1.1. Defining Reading

It is almost impossible to give a short and a precise definition for reading because the term "to read" refers to different things at the same time and involves various concepts. In other words, "the act of reading is not understood nor easily described"

(Aebersold and Field, 1997, p.5). Earlier, Nuttal (1982) suggests that all the possible definitions of reading include at least one word (concept) from the following groups:

(a) understand, interpret, meaning, etc.
(b) decode, decipher, identify, etc. and
(c) articulate, speak, pronounce.

Each of these groups highlights one of the aspects that characterise reading: comprehension, decoding, and pronunciation. For many, as Broughton et al. (1980), reading refers to the understanding of the black marks first and the production of the right voise. In other words, it is about finding the corresponding sounds for the print symbols and it can be useful in teaching pronunciation (group c). However, producing the right voices of the black print cannot be successful unless readers succeed in decoding the words (group b). Reading might be, then, defined as "thought stimulated and directed by written language" (Smith, 2004, p.27). This visual processing of the script involves the identification of letters ,the black print, into words then assigning meaning from the written symbols identified in that text (Aebersold and Field, 1997).

However, it is important to bear in mind that readers are not passive identifiers of letters (Traves, 1994). In fact, the message in any text cannot be passively captivated (Westwood, 2001), readers are active constructers of meaning as they combine information from the text with the information they already have; basically represented in content and formal schemata (Carrell, 1987). Above all, the heart of reading is comprehension which is getting meaning (group a). Reading comprehension is the process of simultaneously extracting and constructing meaning through interaction and involvement with written language (Snow, 2002).

In general terms, reading means moving the eyes across and down the page and understanding the message contained in the text without apparent effort (Birch, 2002).

Yet, reading is not an isolated skill (Johnson, 2008), it is rather a complex process which involves the interaction of sub skills such as the ability to recognise the letters of the alphabet, the ability to match spoken words and sentences with their written representation, the ability to skim the text to gain a general idea, and the ability to evaluate the text for it general tone or bias (Corps, 1989; Smith, 2004).). Mainly, it is a constant process of guessing and, as Grellet (1981) said, what one brings to the text is more important than what he finds.

In brief, all the definitions of reading presented above either focus on the process of reading, a decoding process involving letter and word recognition, using Urquhart and Weir (1998) words "reading is the process of receiving and interpreting information encoded in language form via the medium of print" (p. 22) or on the product, a process of constructing meaning from written texts; "comprehension occurs when the reader extracts and integrates various information from the text and combines it with what is already known" (Koda, 2005, p.4). All the suggestions mentioned above from both views process and products are overlapping. As a bottom word, we can say that reading is an interaction between the reader and the text which ends up with creating meaning and inferring the message transmitted by the author.

1.2. Reading as a Process and/or a Product

The reading process refers to the activity in which information are transferred from the eyes to the brain passing through different steps. During this process, readers look at the print, interpret the marks on the page, identify the words, decide on their meanings, and finally relate these meanings to each other (Alderson, 2000). Many steps take place and different questions are asked by readers themselves through each step of

the reading process to infer the meaning (Rozmiarek, 2005). In fact, it is a complex combination of processes as Grabe (2009) states "functional components of reading":

1. A rapid process
2. An efficient process
3. A comprehending process
4. An interactive process
5. A strategic process
6. A flexible process
7. A purposeful process
8. An evaluative process
9. A learning process
10. A linguistic process (p. 14).

The reading process is ***rapid*** as our eyes move quickly across the print focusing on a few letters or words here and there and forming predictions about meaning (Birch, 2002). In fact, the speed of reading is developed as much as readers read. Accordingly, Frank (1994) suggests faster readers are more effective readers. Speed reading then leads to ***efficient*** reading; efficient not only in the overall rate but also in terms of the ways that various processing skills work together smoothly (Grabe, 2009). Centrally, reading is a ***comprehending*** process.

In effect, reading is about transferring meaning from one mind to a mind (Nutall, 1996) and our role as readers is to understand and infer correctly what the writer intended to convey. Comprehension is at the heart of what it means to really read (Serravallo, 2010) as it results from the interaction between the readers and the text. Accordingly, reading is an ***interactive*** process where the writer and the reader are actively engaged; the text presents information that the author wants the reader to understand, and the reader on his role brings a wide range of background to identify the message conveyed in the text. During this interaction, readers employ a number of skills to decipher text information, select key information, organise and mentally summarise information, monitor comprehension, using all strategies which means that

reading is a ***strategic*** process (Koda, 2005). The readers' ability to employ a range of strategies to achieve their purposes or reasons for reading may differ from one reading session to another as they may shift during the same reading process which makes reading ***flexible.*** Obviously, reading is always ***purposeful*** as readers read in different ways depending on the various reading purposes. Readers always have purposes for reading whether for entertainment or for information (Grabe, 1991). Besides, reading is continuously ***evaluative*** process; evaluation occurs all along the reading session when we decide how we should respond to the text. Ongoing evaluations make reading a ***learning*** process; learning information and learning language texts as linguistic object (TALO) and texts as vehicle for information (TAVI). In academic settings, reading is regarded as the most common way for students to learn new information about the language or the field of study, it is a significant means of broadening one's academic scopes and extending his knowledge of the language (Elly & Mangubhai, 1983).

Undoubtedly, reading is a ***linguistic*** process; it is impossible to read without having reasonable repertoire of linguistic knowledge: graphemic- phonemic awareness, words connections and the structural phrases. In this respect, Brusch (1991) believes where there is little reading there will be little language learning.

On the contrary, the reading product refers to the outcome of the reading process; i.e. what readers have built as comprehension of the text. Generally, comprehension (product of reading) is more or less the same although readers may engage in different reading processes (Alderson, 2000). Yet, the reading of the same text may offer different understandings for different readers depending on how actively they are. As Grellet (1981) endorses, "understanding a written text means extracting the required information from it as efficiently as possible"(p.3); efficiently means combining

interrelated sources of information together as the prior knowledge of the reader, the facts presented in the text, and the context of the reading situation.

In fact, comprehension is a matter of degrees (Koda, 2005). Some readers extract more than others from the text some contexts foster comprehension better than others, and some texts are more easily understood than others. According to Alderson (2000), the product approach to reading focuses on investigating the levels of understanding of texts. Westwood (2001) highlights four levels of understanding: literal level, inferential level, critical level, and creative level (See Chapter 02).

In recent years, there is a shift in focus from the Product Approach to reading to the Process Approach as researchers are more eager to understand what happens during the process. They are more interested in how readers reach that understanding, and less concerned with the fact that they reach it.

1.3.Variables Affecting the Nature of Reading in a Foreign Language

In the present research, the focus is on reading in English as a Foreign Language (EFL) where readers have already achieved a particular reading competence in L1, L2 and in FL. In fact, FL readers approach texts with -at least- dual language systems; which is seen as an advantage, as Davies (1995) believes. Generally, FL readers attempt to transfer their experience in L1 and L2 reading to the new reading experience (FL). For that, research literature on reading showed that there is no single generally accepted theory for FL apart from selecting and borrowing aspects of L1 and L2 theory.

To shape the nature of reading in a FL, Alderson (2000) suggested two main views that control FL reading: the reader and the text variable.

1.3.1. Reader Variables

The reader is a significant aspect in shaping the nature of reading in a foreign language. It affects the reading process in various ways in learning and remembering text information depending on what he brings to it. From the reader's perspective, Hedgcok and Ferris (2009) highlight different aspects that can be grouped into two broad variables: the reader's knowledge (formal and content schemata), and his psycholinguistic perspective (language competence, motivation, purpose in reading, and the reader's skills and strategies).

To open the discussion, we need to define the EFL reader in our situation of concern. EFL readers refer to the students who are pursuing their education in their home countries. They study English either to fulfill graduation requirements, the case of our sample of study, or as a major field of study. Hedgcok and Ferris (2009) state three major features that characterise EFL readers; they do not experience culture shock, their motivations and interests may not be identical to those of international students. Besides, they are less motivated and interested to improve their skills, and they may not have much resources outside the class to develop their FL skills (e.g., interaction with native speakers, FL television and radio, unlimited print resources in the FL).

1.3.1.1. Reader's Schemata

Schemata refer to the different knowledge the reader brings to the text (Aebersold & Field, 1997); i.e, the reader's pre-existing concepts stored in his memory about the world and about the text to be read, aptly termed as "theoretical metaphor" by Grabe (2001) . For everything in life there are individualized schemas (Tracy & Morrow, 2006), or "the organised package of knowledge the brain uses to arrange and group similar experiences and concepts" (Johnson, 2008, p.4). Schemas, or schemata, are seen

as cognitive constructs by which one organises information in our long-term memory (Widdowson, 1983).

In the light of their existing knowledge and expectations, readers process new texts by activating their schema before and while reading which contributes significantly in building the readers' comprehension and recall. Efficient comprehension is a result of an interactive process between the reader's background knowledge and the text reader's expectations are based on the reader's prior knowledge. Students with limited experiences and background knowledge have difficulty making connections to the reading and the material being presented. Schemata can be divided into content schemata and formal schemata (Carrell, 1987).

On the one hand, *Content Schemata* refers to knowledge about the content of the text which needs to be activated by the reader to understand it. According to Alderson (2000), content schemata can additionally be divided into three different types: knowledge of the subject matter/topic, knowledge of the world, and cultural knowledge. Readers who are weak in one of them will rely on the other to compensate for their weaknesses. Knowledge of the subject matter or topic is associated with content and topic of the text. Evidently, the more familiar texts are for readers (studied before or falls within their scope of speciality), the easier will be for them to understand and recall. Schemata theory suggests that without existing schemas it is very hard to learn new information (Tracy & Morrow, 2006).

Background knowledge of the text has a positive effect on levels of performance in reading comprehension tests. Test takers are generally found to perform better whenever they are introduced to subject areas with which they are familiar (Grabe, 1991). Results showed that gender differences in foreign language reading comprehension tests are affected by the topic of the text. Knowledge of the world is

created through experience with people, objects, and events in the world and the activation of such a knowledge becomes fast and automatic. In this respect, Hedgcok and Ferris (2009) add that, text processing is not only influenced by the abstracted set of expectations developed through experience, but also by the cultural knowledge which also appears to be a source of difficulty in comprehension.

Thus, cultural knowledge and differences appear as another important factor that may affect readers' comprehension in a negative or a positive way. Content schemata are important for all readers, but specific aspects of content knowledge may be particularly problematic for FL readers (Carrell & Eisterhold, 1983).

On the other hand, *formal Schemata* refer to the reader's knowledge of language; linguistic conventions and discourse-level items (Aebersold & Field, 1997). It covers the knowledge of grammar, vocabulary, texts organisation, and registers' features (Carrell, 1983). Before FL learners can read, it is assumed that they must first acquire language knowledge. No one can read and understand in a FL without having an adequate linguistic competence in that language. Many comprehension problems in a FL are created by the lack of such a knowledge or by the inability to activate it. Reading researchers, then, suggested the notion of the threshold of linguistic knowledge in an attempt to overcome such problems.

Basically, good readers can activate the appropriate formal schemata when reading, their comprehension and memory of that text will be enhanced. Some formal schemata may transfer cross-linguistically or cross-culturally (Hedgcok & Ferris, 2009). Much earlier, Carrell (1983) suggested that many FL readers fail to use their background knowledge because they were linguistically bound. Similarly, Alderson (1984), found that a threshold level of EFL proficiency above the effect of EFL proficiency on reading comprehension and recall changed. The threshold level of

language proficiency may allow readers to engage in a top-down processing. Readers from high-knowledge backgrounds were able to comprehend text complexity better than low-knowledge readers (Bernhardt, 2011).

1.3.1.2. Reader's Perspective in Reading

The most popular view of reading in EFL is the psycholinguistics model of Goodman (1967) who described reading as a "psycholinguistic guessing game." In this view, reading is seen as a process of four cyclical phases, a process of sampling the text, making predictions, testing the predictions (confirming or disconfirming), and making new hypotheses. The early psycholinguistic model is primarily a conceptually driven model where the emphasis is on prediction of meaning through using the print language.

This model is elaborated later by Coady (1979) through isolating the variables: conceptual abilities (general intellectual capacity), background knowledge, and process strategies which include general language processing skills (word level, lexical and syntactic knowledge, and learning strategies (linguistic ability) and suggested a model based on schema theory. In this model, more emphasis is given to the background knowledge which was neglected in the early psycholinguistic model. Two types of information processing are involved in the reader's interaction with the text: bottom-up (data-driven) and top- down processing (conceptually- driven) (Silberstein, 1994). Later on, the interactive models of reading emphasise that completing the reading task both processing are important. (See section 1.4.1.3.)

1.3.1.3. Reader's Linguistic Competence

Linguistic competence means the knowledge of language systems. It "is concerned with knowledge of the language itself its form and meaning" (Hedge, 2000, p.46). It

involves knowledge of spelling, pronunciation, vocabulary, word formation, grammatical structures, sentence structure, and linguistic semantics. Researchers in the field claim that readers cannot engage meaningfully with the text until they reach a threshold of linguistic level (Clark, 1979). In this respect, Klapper (1992) states that success in FL reading is directly related to proficiency in the language. For that, language proficiency is regarded as the most influential variable of successful FL reading as it serves as a means for readers to acquire knowledge in the content area (E. Eskey, 2005). Every text requires a particular degree of linguistic competence; texts that are linguistically difficult require a higher degree of linguistic proficiency from the reader, and vice versa. According to Namjoo and Marzban (2014) the complex task of reading requires not only readers' abilities of analyzing, synthesising and evaluating but also readers' knowledge about the vocabulary and grammar of the target language.

1.3.1.4. Reader's Motivation

Reading is an enjoyable activity where readers' motivation and interest have a direct influence on the quality of reading. We can hardly imagine someone reading and understanding something if he does not like it. Carrell and Eisterhold (1983) said that readers with higher interest engage more actively with text, though the level of reader's interest is not independent of the text, and may decrease while reading is in progress. For that, the subject of reading materials should be of high interest and relate well to the background of the reader.

With individual differences, Hedgcok and Ferris (2009) believe that learners' motivation is a vital concern in language learning whether it is intrinsic (from within oneself) versus extrinsic (in contrast to being imposed by others) motivation, or integrative (source of motivation) versus instrumental (the purpose of language

acquisition is more utilitarian) motivation. In most EFL classroom settings, students are instrumentally motivated to read i.e., studying primarily for practical purposes as Gottfried (1990) concluded in his study that reading comprehension positively correlated with intrinsic motivation for reading. Generally, competent readers are intrinsically motivated as they read with curiosity, involvement, and preference for challenge. Thus, teachers should cultivate students' intrinsic motivation and promote its development through encouraging students to do more efforts to achieve their self-selected goals as it has an important impact on reading development (Grabe & Stoller, 2002).

1.3.1.5. Reader's Purpose in Reading

No one denies the fact that reading is purposeful, for there is always at least one purpose for reading. In fact, readers approach the same text in different ways according to the various reading purposes they have, which reflects variations between readers. In addition, the readers' purpose in reading may constantly vary from the beginning of the text to its end. In FL classrooms, most readers do not have a precise purpose for reading which result in having a meaningless reading session as readers fail in bringing understanding to the text (Klapper, 1992).

In most of the cases, readers go through the same text for a variety of reasons; for each purpose, they employ the appropriate strategies. Reading in formal contexts is part of learning or engaging in jobs, it may also be quite demanding in some educational, professional, or occupational settings like the case of our subjects (Grabe, 2009). FL readers are said to read for particular purposes mainly looking for information with focus on getting the general idea of the text. For example, reading a text to get a general idea may require the reader to pay less attention to details than when reading a text to

get key information. Thus, we can say that every purpose needs the use of different skills and that the reason for which we are reading a text will influence the way we read it, the skills we use and the ultimate understanding and recall we have of the text. Indeed, reading serves multi-faced purposes.

1.3.1.6. Reader's Skills and Strategies

Readers not only have knowledge, but they also have abilities and strategies to learn and to process information. Subsequently, reading skills and strategies have been a major area of research (Grabe, 1991). Reading strategies "are tools that proficient readers use to solve the comprehension problems they encounter in texts" (Moreilon, 2007, p.10). They play an important role in helping readers get the meaning of what they read. For that, students need to be aware of its importance in making them successful readers. Munsakorn (2012) endorses the significance of being a strategic reader through recommending teachers to provide students with guidance on reading strategies before they start reading and not only teach them what reading strategies are, but to teach them also how to choose the appropriate ones, how to use them successfully and to apply them interchangeably.

In this respect, Oxford (1990) draws a difference between good and poor readers in terms of skills and abilities used in processing information from the texts they read. Because of their importance, many practical instructions on reading strategies are suggested in literature (See section 1.5).

1.3.2. Text Variables

On the other side of the coin, many aspects of the text can make the reading process easy or difficult. Text content, text genre/type and linguistic features have an apparent

influence on how readers process the text.

Before embarking on the discussion about text-based variables, we need first to offer a definition for the text. In fact, a variety of definitions of the text have been suggested by reading theorists, linguists, and specialists in text analysis. One of the influential definitions of a text is that offered by Halliday and Hassan (1976, pp.1-2):

> A text is a unit of language in use … and it is not defined by its size… A text is best regarded as a semantic unit; a unit not from but of meaning. A text has texture and that is what distinguishes it from something which is not a text. It derives this texture from the fact that it functions as a unit with respect to its environment.

Following the above definition, a text, linguistically speaking, refers to the spoken or the written piece of language; regardless to its length. Simply, it is "the physical manifestations of language" (Wallace, 1992, p. 6). It includes the graphic symbols such as letters of the alphabet or characters and the nonverbal elements such as capitalization, punctuation, paragraphing, and format that represent a unified meaning and produced for a communicative purpose (Widdowson, 2007). The text, is then, a unified whole which in turn makes every text unique due to the dynamic relationship between context and text (Davies, 1995).

1.3.2.1. Text Topic and Content

Generally speaking, comprehension is affected by what readers know about the text content they read. Knowledge of the text content plays a vital role not only in reading but also in reading comprehension. Obviously, text content affects how readers process the text, for instance, abstract texts seem to be harder than the concrete ones that describe real objects, events, and activities (Alderson, 2000). In other words, the more concrete imaginable and interesting texts are, the more readable they are. In addition,

the more the texts fall within their familiar area the more interesting they are, although what is familiar for someone will not be for another. Peretz and Shoham (1990) proved that text familiarity correlates positively with reading comprehension tests; students' reading performance is proved to be better using texts which are seen to be generally more familiar rather than less familiar. In fact, unfamiliarity with the content of the text in FL not only brings extra challenges to the readers but also affects their scores in comprehension tests. In the same line of thought, Feng (2011) states that the content of a text should be sufficiently familiar to test-takers so that candidates of a requisite level of ability have sufficient existing schemata to enable them to deploy appropriate skills and strategies to understand the text. For that reason, the text-variable appears to be an important criterion in selecting reading materials whether for the purpose of teaching or testing reading.

1.3.2.2. Text Type and Genre

The other important text variable is text type and text genre. Genre primarily refers to "the language processes involved in doing things with language" (Knapp & Watkins, 2005, p.21). To paraphrase, the internal (linguistic) criteria forming the basis of text type categories. Traditionally, text types refer to rhetorical categories, like narration, description, exposition and argumentation. Consequently, it is assumed that there is an obvious difference in readers' processing of every text-type (narrative, descriptive, argumentative or expository) (Feng, 2011). All what makes a text different from another in terms of style, or the text features directly affects comprehension (Alderson, 2000). For example, readers need to be familiar with the organisation of, say an expository text, such as the key role of the abstract and/or introduction in indicating

the purpose of a text at an early stage (Evans, 2008) in order to achieve full comprehension. Basically, what distinguishes one text type or genre from another is the way the text is organised; the different organisations might lead to different outcomes or processes, hence, making EFL learners aware of how texts are organised is very important for reading fluency, comprehension and efficiency (Farell, 2009).

1.3.2.3. Text Organisation

Simply, it refers to the way paragraphs relate to each other involving the relationships between ideas. It is based on two main aspects: cohesion and coherence. Brown and Yule (1983) believe that some of the coherence of a text derives not so much from the presence or absence of surface cohesive features such as conjunctions but from underlying text relationships to which conjunctions are pointers. Mayer (1975) distinguished five different types of expository text representing different ways in which writers organise and readers understand topics collection (lists) causation (cause and effect) response (problem-solution), comparison (compare and contrast) and description (attribution). There is a strong evidence that knowledge on how a text is organised influences the comprehension of the text (Grabe, 2001). Discourse markers that contribute in making the text organisation can facilitate discourse processing for average-ability readers when the topic is less familiar (Alderson, 2000).

Similarly, comprehension is affected by poor rhetorical organisation, lack of connectives can seriously damage comprehension. It may be that the effects of cohesion are weak because readers can make bridging inferences; cohesion is not a key variable in readability. In this respect, Zarratia, Nambiarb, and Maasumb (2014) emphasise the importance of teaching students to recognise and use structural organisation of text to improve comprehension and recall.

Students' knowledge about the specific logical patterns of organisation, such as cause effect, comparison and contrast, and problem- solution, facilitates the reading process (Carrell, 1984). Indeed, teaching text structure increases considerably the amount of recalled information. In this respect, Nuttall (1982) states that interpreting difficult sentences becomes an easier task simply if readers were able to identify the principle by which the text is organised and ideas are connected. Due to the importance of text organisation in comprehension, Grellet (1981) suggests different types of exercises that train students to recognise text organisation; rejecting irrelevant information, finding the topic sentences and what kind of relation they have to the rest of the text, discriminating between generalisations and specific statements, and completing skeleton outlines of the structure of the text.

1.3.2.4. Linguistic Features of the Text

Research proved that there is a close connection between the linguistic features of texts and students' comprehension. On the whole, reading is affected by the text difficulty which is determined by the vocabulary and grammatical structures. In this respect, Wallace (2003) states that linguistic features of texts can frustrate or facilitate reading acquisition. To illustrate, expository texts, for example, are written for a wider audience with diverse readers who need not rely on shared experiences to understand them for that they may present local comprehension difficulties due to linguistic features (DuBravac & Dalle, 2002).

As a matter of a fact, vocabulary knowledge is a primary link to comprehension (Tankersley, 2003). Research studies argued that the relationship between vocabulary knowledge and reading comprehension is so strong that they can produce perfect correlations (Grabe, 2005). Successful reading comprehension depends heavily on

readers' knowledge of meanings of individual words that appear in a text (Koda, 2005). Actually, vocabulary size and depth are strong variables in overcoming comprehension difficulties (Nation, 1990). At the same time, encountering unknown words while reading obviously affects the readers' comprehension and might decrease their motivation and pleasure.

Another important component of the linguistic knowledge which proved to have a strong impact on comprehension is grammar. Lack of grammatical knowledge is seen as one of the main reasons (Urquhart & Weir, 1998). In this respect, Alderson (2000) highlights the importance of a knowledge of particular syntactic structures which is clearly seen in the findings from studies of syntactic simplification. In syntactic simplification process, the grammatical complexity of a text is reduced while the information content and meaning are maintained, many texts are proved to be much easier to comprehend.

1.3.2.5. Verbal and Non-verbal Information

Not all the information presented in the reading passages are verbal, but there exists another type of information called the non-verbal information which takes a form of tables, graphs diagrams and other forms including maps and pictures. This form of presentation of data acts as an alternative or complementary support for the verbal information provided in the text. It is proved that texts that contain only verbal information will be dense and more difficult to process (Anderson, 2000). Subsequently, sometimes without the non-verbal support, especially with diagrams and illustrations, the text cannot be understood. According to Eloza and Iglesias (2002), non-verbal information have four different functions in texts: convey information, convey texture, attract readers' attention, and summarise information. Both verbal and

nonverbal information can play a significant role in helping students while reading. Although these factors are not necessarily make-or-break aspects of text selection, they can help teachers assess the relative merits of competing texts they might be considering (Hedgcok & Ferris, 2009).

The implications for testing are clear: not only must the normal relationship between the verbal and the non-verbal information in text be maintained, but testers should consider the assessing of readers' ability to understand that relationship, as well as their ability to use the graphic information to understand the verbal information, and vice versa.

1.4. Processing Reading in a Foreign Language

The reading process can be represented in two types of models as Grabe and Stoller (2002) stated: Metaphorical Models of reading and Specific Models of Reading; each of which provides an explanation for what happens in the visual system and the brain during reading. The specific models based on empirical evidence and metaphorical models that make more generalisations (Grabe, 2009). Davies (1995) defines the model as formalized, usually visual representation of what goes on in the eyes and the mind in the text's comprehension.

1.4.1. Metaphorical Models of Reading

According to Grabe and Stoller (2002), these models represent metaphorical generalisations that stem from comprehension research conducted over the past four decades. It covers bottom-up, top-down, and interactive processing.

1.4.1.1. Bottom- up Processing

This model that proceeds texts in a series of progressively high-order stages. It starts with the visual input and ends with the achieved meaning going through a sequence of separate phases. Davies (1995), summarises the bottom-up stages of constructing the meaning embedded in the smallest units of text as follows: *1.* Eyes look *2.* Letters identification sounded out *3.* Words recognized *4.* Words allocated to grammatical class and sentence structure *5.* Sentences give meaning *6.*Meaning leads to thinking (p.53).

It is also termed as 'data driven' as it requires language processing at all levels; word, sentence, and discourse (Silberstein, 1994). In the Bottom-up model (text to brain model), the reader is assumed to decode precisely from left to right, the case of English, and words in larger grammatical units in retrieving the writer's meaning step by step from the text (E.Eskey, 2005). The emphasis is on the written language -printed words- with little influence from the contextual information where the task is recognising letters, interpreting them into sounds, then structuring words and sentences, to finally building meaning and thinking. In brief, readers constructs the text from the smallest units (letters to words to phrases to sentences) decoding is an earlier term for it (Aebersold & Field , 1997).

The following figure summarises the different steps of the bottom-up models.

Figure 1. A processing of decoding linguistic symbols
(Cambourne cited in Nunan 1991, pp 63-5)

1.4.1.2. Top- down Processing

By contrast to the bottom-up model, the top-down model is knowledge- based or conceptually –driven information (Silberstein, 1994). This processing occurs when readers use their prior knowledge to make prediction together with word recognition; as they process a text in interrelated stages one melting in the other. To such a processing, Birch (2002) sees that readers just move their eyes quickly across the text, focusing on a few letters or words here and there and forming predictions based on 'higher order' sources of information for getting meaning

This processing starts by eye fixation to select graphic cues to form a perceptual image in a form of a mental representation. Next, readers try to develop their perceptual image by looking in their memories for syntactic, semantic and phonological cues. At this juncture, readers attempt to make a tentative choice by guessing the meaning of one word in the text relying on their previous experiences and their knowledge about language. In case the guess is correct, then it is kept in the medium-term memory; whereas if it is wrong, readers go back to the preceding step and form another guess. After the meaning is hypothesized it is tested during reading. If the tested anticipations of meaning fit with the earlier material, a meaning is assimilated with prior meaning from the text and the new learnt meaning is stored in the long- term memory. At this point, a hypothesis about the informative text is made and the cycle is repeated (Rayner and Pollatsek, 1989). Figure 2 illustrates the point.

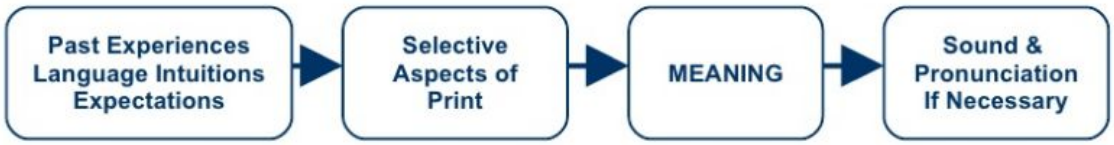

Figure 2.A process of meaning reconstruction (Cambourne in Nunan 1991, pp.63-5)

1.4.1.3. Interactive Processing

This model absorbs the qualities of both bottom-up and top-down models and avoids their limitations to a great extent. Interactive processing views reading as interaction between readers and texts which differs according to the text, reader, and purpose (Grabe,1991). Readers make sense of what they read by decoding the linguistic items on the page (bottom-up) and use their previous knowledge that is related to text topic (top-down processing).

To Rumelhart (1977), the process of reading "begins with a flutter of patterns on the retina and ends with a definite idea about the author's intended message"(p.573). This model focuses on the simultaneous process of information from different sources; visual, orthographic, semantic, lexical and schematic. This means that reading is perceptual and cognitive at the same time. The first model proposed starts with a 'visual information store' as a first stage in the reading process. The important features are then selected by a cognitive 'feature extraction device'. After that, a 'pattern synthesiser' comes up with the most probable hypothesis of the text based on the selected important features combined with linguistics and world knowledge. These multiple knowledge sources continue interacting with each other until a final acceptable hypothesis is reached. In short, the reading process in the Rumelhart model is both perceptual and cognitive (Hudson 2007).

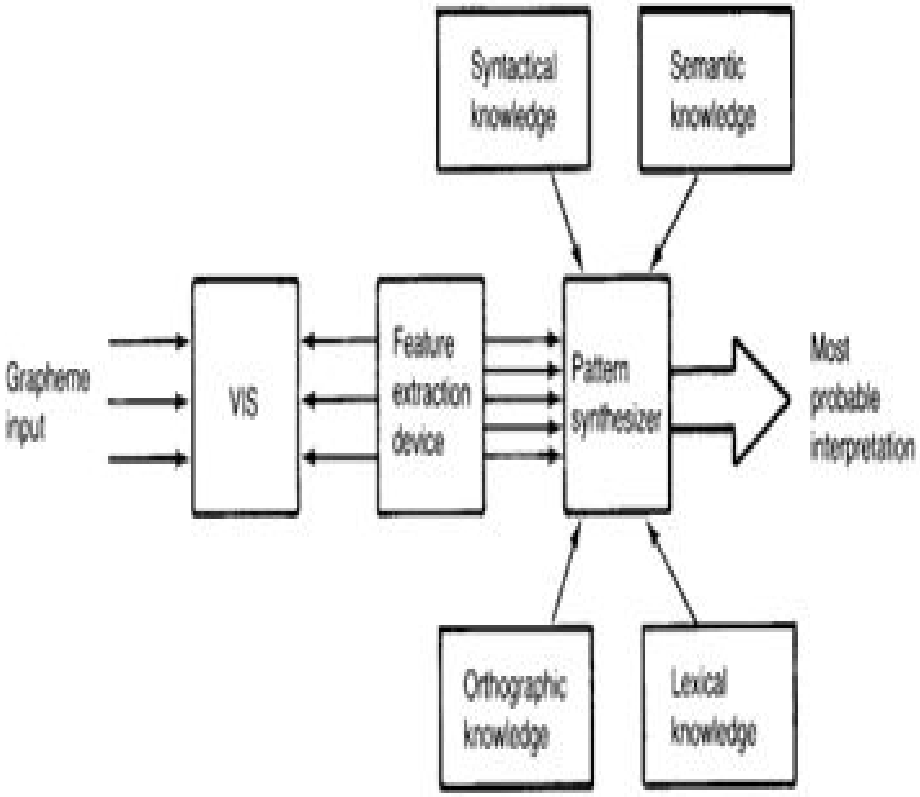

Figure3.Rumelhart's interactive model. (Rumelhart ,1977, p.574).

Davies (1995) added that in this model, reading is seen as a metacognitive process in which the graphemic information, stored in the Visual Information Store (VIS) are the starting point for the process of reading. This input information is operated on by the feature of extraction devise. This feature is then fed into the pattern synthesiser which has access simultaneously to all kinds of information. Subsequently the combination of all these sources results in the interpretation of meaning (Figure 3).

In fact, the interactive model emphasises the contribution of all the various types of sources, both high and low levels of information co-exist and they flow upward and downward. Readers process letters and words and at the same time make predictions

about meaning. Information move from one level to another in both directions and they are separately represented in memory. Yet, no explanation on how these information interact is suggested.

Accordingly, interactive models of reading comprehension have received some criticism. To Urquhart and Weir (1998), such models are valid only for careful reading, and are not always applicable when English language teachers deal with different kinds of readers. Therefore, more elaboration is needed to explain and describe other types of reading.

1.4.2. Specific Models of Reading

Specific models of reading presented in this section are widely discussed in the reading research, which are basically cognitive processing that provide insights into reading. The following list, from Grabe (2009), contains the widely recognised models:

1. Construction-integration Model
2. Structure Building Framework
3. The Landscape View of Reading
4. Capacity Constrained READER (CC READER) Model
5. Interactive Compensatory Model
6. Verbal Efficiency Model
7. Compensatory-encoding Model
8. Simple View of Reading
9. Rauding
10. Dual-coding Theory
11. Word-recognition Models
12. Psycholinguistic Guessing Game Model (p. 91)

1.4.2.1. Construction-integration Model

The construction-integration model (CI) is a general theory of discourse comprehension that allows readers to construct computational models of processes. This theory describes the complete reading process, from recognising words until constructing a representation of the meaning of the text. The Construction element of

the CI model theorises that instead of constructing only one possible meaning for a sentence, that several meanings are possible (Kintsch, 1988).

In this hybrid model, the construction of a text base which involves propositions derived from the text and the relationships between them and situation model that covers cognitive representation of the situation reflected in the text which and sometimes information derived from previous experience and from general knowledge. In simpler words, comprehension is derived from the interaction between the text (bottom-up processing) and the general knowledge and personal experience the readers brings to situation. It involves a process of contextual integration follows the construction of a mental representation of the text, ensuring that contextually irrelevant items become deactivated.

1.4.2.2. Structure Building Framework

A theory of discourse processing that seeks to explain how comprehenders build mental representations of extended discourse (Traxle, 2011). It explains how discourse including verbal and non-verbal materials, is interpreted and remembered. According to Grabe (2009), the discourse processes in structure building is made of five steps: Laying a foundation, mapping on the foundation, shifting to a new foundation, suppressing information and enhancing information. Readers, as a first step, lay foundations for their mental structures taking the initial input (word, sentence, clause, picture) which are regarded as optimal cues. Next, they map on information to develop their mental structures as the information fit with what is previously processed. If the incoming information are new to the foundation, readers engage in another cognitive process by shifting to a new substructure. Inappropriate meanings activation is then decreased by suppression mechanism. Along, anaphors both enhance their antecedents' activation

and suppress the activation of other concepts, with the net effect that after anaphoric reference, antecedents are more activated than other concepts.

1.4.2.3. The Landscape View of Reading

This model of reading is simply about how readers build their comprehension through discourse processing over word recognition. It yields important insights to the relationship between reading comprehension and memory representation by explaining the processes which take place during reading and specifies how these processes result in a stable memory representation of the text (Van den Broek et al.,1996).

To paraphrase, readers activate the concepts which exist in the text together with the relationship that exists between these concepts using four potential sources of activation: the text, preceding reading cycle, earlier reading cycles, and background knowledge. By reading cycle, we mean the reading session. Activating concepts from the three other sources is done either because it is required for comprehension or it is associated with information in the current reading cycle. In fact, readers can, through different processes during almost every reading cycle, activate new concepts, retain old ones, and remove other from attention.

1.4.2.4. Capacity Constrained READER (CC READER)

According to this model, readers combine lower-level automatic processing and higher-level interactive processes within a capacity- constrained view of working memory (Grabe, 2009). It is first introduced by Just and Carpenter (1987) who focused on eye movement data and cognitive processing production and highlighted the role of individual differences on working memory processing and performance in comprehension tasks. The CC-READER addressed the limited capacity issue of working memory resources available for both integration operations and storage.

1.4.2.5. Interactive Compensatory Model

It is introduced by Stanovich (1980) who extended Rumelhart's (1977) Interactive Model claiming that text processors are interactive, nonlinear and compensatory. When one process is less efficient other process will compensate to reach comprehension. In other words, Stanovich (1980, p. 48) believes that "the interactive-compensatory conception allows for reader with poor letter or word recognition skills to draw heavily on higher-level knowledge sources". According to this model, poor readers proved to have more dependence on the contextual features whenever they have poor word analysis skill; even with insufficient data (part of the print is not clear; wet for example) other processors compensate for it. For instance, if the orthographic processor would not be able to work effectively, other processors would compensate, namely the syntactic processor through suggesting an appropriate word that makes sense in the sentence. Following this model, fluent readers devote more processing capacity for comprehension and less capacity for word recognition unless there are problems with it, then readers will use more to encounter the problems at the expense of some of the capacity for comprehension. This model is very apparent in the classroom during a cloze exercise (Tracey & Morrow 2006) where graphic information are missing from the text, yet readers can figure out what are the missing words using the syntactic cues.

In short, according to Grabe and Stoller (2002), this model argues that (a) readers develop efficient reading processes, (b) less-automatic processes interact regularly, (c) automatic processes operate relatively independently and (d) reading difficulties lead to increased interaction and compensation, even among processes that would otherwise be more automatic.

1.4.2.6. Verbal Efficiency Model

This model assumes that efficient lower-level processing skills allow cognitive resources to be used for other higher-level comprehension processes. It maintains that the inefficient word processing skills often inhibit readers' problems with higher-level comprehension skills (e.g. processing of the concepts in texts, building a coherent interpretation of text content, and use of reading strategies) (Perfetti, 1985).

To put it differently, skilled readers [do] automatically use lower-level processes along with effective word recognition skills that are used for boosting comprehension. It suggests that inefficiency in lower-level processing inhibits text comprehension; for instance, slow word processing inhibits comprehension as it hampers automaticity and fluency of reading.

1.4.2.7. Compensatory-encoding Model

It is based on Verbal Efficiency Model adopting its basic assumptions adding compensatory mechanisms. These compensatory mechanisms are metacognitive in nature, and are controlled processes which are continually used to counter inefficiencies and achieving comprehension. This model maintains reading processes of less skilled readers that are presumably slower, more effortful, require more attention, are more susceptible to strategic control, and are more selective. However, exhaustive documentation of these differences would still leave open the question (Walczyk, 2000).

1.4.2.8. Reading Model or the Simple View of Reading

The Simple View of Reading (SVR) is a model of the process of learning to read which is based on a simple idea, as its name indicates. It is the most significant model

which involves a combination of word recognition abilities along with general comprehension abilities, i.e, it consists of two components: decoding and linguistic.

This model is related to other models of reading and it suggests that reading comprehension is the product of decoding and comprehension abilities (Grabe, 2005). It does not deny that reading is a complex process, however, it holds that these complexities can be divided into two parts: decoding which is measured through a traditional word recognition test that assesses readers' ability to pronounce isolated words, and comprehension is measured through assessing the ability to answer questions about the contents (Carver, 1993).

1.4.2.9. Rauding

It is a model that combines reading with auding. In this model, reading efficiency involves reading rate (decoding skill and general cognitive processing skills) and reading accuracy (decoding skill and comprehension skills) (Grabe, 2009). Rauding is one of the few theories that make specific assertions about purposes for reading and supports theses assertions empirically.

Accordingly Carver (1993), summarised the constructs which are similar to traditional concepts in reading in:

- Difficulty level involves level of material difficulty and readability.
- Rauding accuracy includes level reading level, reading ability, level of reading comprehension ability.
- Reading rate level comprises reading rate, typical rate of reading, rate level of ability
- Rauding efficiency level refers to general reading ability, general ability to comprehend while reading, efficiency of comprehension level

- Auditory accuracy similar to linguistic comprehension ability, listening capacity, language comprehension ability, listening ability, auding ability
- Pronounciation level or decoding ability, word recognition ability, word identification ability

1.4.2.10. Dual-coding Model

It is a unique and an important model of reading. It deals with identifying the relationship between the visual-verbal information. This theory assumes that there are two cognitive subsystems, one specialised for the representation and processing of nonverbal objects/events (imagery), and the other specialised for dealing with language. In this respect, Grabe and Stoller (2002) assert that both cognitive processing systems (visual and verbal) work together to improve reading comprehension abilities.

The dual Coding theory identified three types of processing that tasks may require any or all of the three kinds: (1) representational, the direct activation of verbal or non-verbal representations, (2) referential, the activation of the verbal system by the nonverbal system or vice-versa, and (3) associative processing, the activation of representations within the same verbal or nonverbal system (Grabe, 2009).

1.4.2.11. Word Recognition Model

It is based on the connectionist theories. It is seen as key component of reading. In fact, word recognition as Grabe (2009, p.101) states "is an interactive process of accumulating phonological, orthographic, and semantic (possibly syntactic and morphological) information (through increasing activation)". Several word recognition models are bottom-up in orientation and provide an explanation for word recognition processing as it is likely to occur in fluent reading focusing on visual processing of orthography and words units.

1.4.2.12. Psycholinguistic Guessing Game Model

It is the well-known model of reading in literature. It is first introduced by Goodman (1967) as a "guessing game" that involves a process of guessing meaning in four cyclic steps: make hypotheses about what is coming in the text, sample the text

again in order to test their hypotheses, confirm (or disconfirm) them, make new hypotheses. In their processing, readers do not have to decode every letter or word: instead, they reconstruct the text according to the graphic cues they have sampled, aided by knowledge of the language. Goodman's model claims that reading is typically the same among across all proficiency levels and across all languages, yet this not true. Reading is not a natural developing process. According to Birch (2002), there are two limitations of this model, it oversimplifies many people's idea of the reading process and it neglects instruction about sounds and letters.

1.5. Reading Strategies in a Foreign Language

Reading is not a passive activity; it is rather an active process in which readers bring different strategies to the text. In most of our reading getting meaning is either an explicit or implicit purpose; yet all readers use various strategies and employ different abilities in so doing. According to Li (2010) "reading strategies are deliberate, conscious techniques that readers employ to enhance their comprehension or retention of the textual information"(p.185). In other words, strategies are those effortful and purposeful techniques that help readers overcome different difficulties associated with comprehension. Other strategies are more general in the sense that they help the reader become more active and engaged in the reading process.

As a matter of a fact, there are many reading strategies that help readers to develop their reading comprehension skill. McNamara et al. (2007) propose a framework for classifying reading strategies which is based, in fact, on comprehension monitoring. Following the prongs framework, strategies are grouped as follows: (a) Preparing to Read; (b) Interpreting Words, Sentences and Ideas in Text; (c) Going Beyond the Text; and (d) Organising, Restructuring and Synthesising the Text.

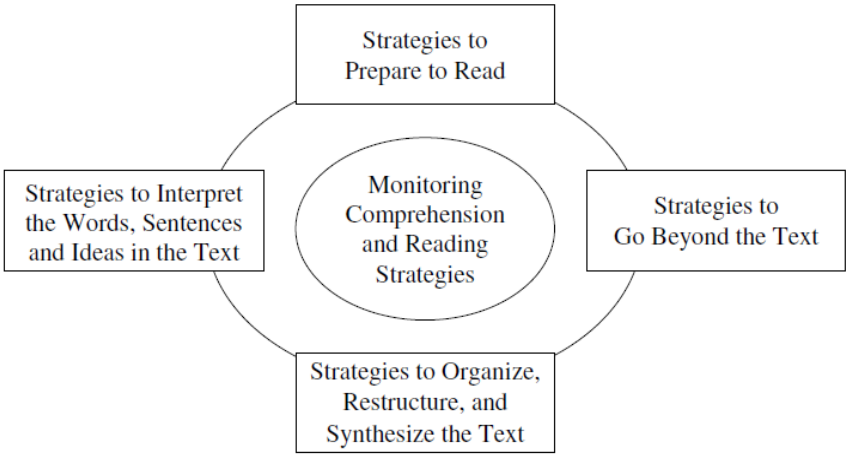

Figure 4. The 4-pronged framework for reading comprehension strategies (McNamara et al., 2007, p. 467).

1.5.1. Strategies Prepare to Read

These strategies help in preparing readers for the reading process through helping them define the goals that guide them and activate prior knowledge. In other words, they prepare a learner to read by helping him formulate the reading goal and determine what he already knows about the topic and, consequently, determine the way he or she needs to process information discussed in the text. Prereading strategies include techniques of previewing sections of the text (scanning or skimming the text), creating concept lists and maps before reading, and generating prereading questions (McNamara et al., 2007). Such strategies serve a number of purposes including: allowing readers to become familiar with text contents and activate prior knowledge and helping readers to identify and take advantage of the text structure. Previewing the text is the most well-known pre-reading strategy together with skimming and scanning.

1.5.1.1. Skimming

Simply, it is the reading for gist that helps in saving time (Urquhart & Weir, 1998), or "glancing rapidly through a text to determine its gist, for example in order to decide

whether a research paper is relevant to our own work …or to keep ourselves superficially informed about matters that are not of great importance to us" (Nuttall, 1982, p. 34). In fact, it is a careful activity, as Grellet (1981) earlier states that involves a definite reading competence and requires a general view of the text. Skimming is generally for having an idea about the text to decide about its relevance not looking for something specific. In addition, it enables the readers to select texts, or parts of texts, that are worth spending time on. Due to the methodological nature of skimming it is always recommended to be the starter in any reading task.

According to Bindon and Santeusanio (2006) skimming is a common, quick and effective strategy that helps readers have a global idea of text, length, structure, and difficulty and to assess whether it fits their reading purpose. Using skimming as a starting task in any reading activity helps readers to decide whether to engage in reading or end it in reading the title. Besides, it aids readers in choosing the appropriate sub-skills to extract the needed information vis- a-vis their reading purpose. Following is skimming when reading permits readers to skip words, sentences and even paragraphs to enable them gain an overview of the text and identify its main points.

1.5.1.2. Scanning

Unlike skimming, scanning is "glancing rapidly through a text either to search for a specific piece of information (e.g. a name, a date) or to get an initial impression of whether the text is suitable for a given purpose" (Nuttall, 1982, p. 34). In simpler words, scanning is a type of speed reading technique of reading where readers need not to understand the whole text but only locating a particular piece of information. This selective strategy involves looking for specific information or language aspects to achieve very specific reading goals.

According to Grellet (1981), scanning trains readers to run their eyes over a text quickly and stops at the needed information and read it with careful attention. To put it differently, readers are not obliged to read the whole text –every word and sentence- from the beginning to the end, they are rather recommended to do jumps around the text in an attempt to find the needed information. Scanning is effective in academic settings as it enables readers to go through different materials to quickly take out the needed information.

1.5.1.3. Previewing

Unlike predicting, previewing is a very specific reading skill (Grellet, 1981). This technique involve finding out where the required information is likely to be. For that, it involves using the title of a text, the table of contents, the index, the appendix, the preface of the author or publisher, headings or subtitles of chapters and paragraphs, information in the back cover, acknowledgement, etc.

This skill is useful for students in many ways. It doesn't only lead them towards the intended and specific information, but it also saves their valuable time. They can naturally apply this technique in locating an article in a newspaper or in an edited book, or having a few minutes to get an assumption or idea of a book through the text on the back cover and the table of contents, etc.

1.5.2.Strategies to Interpret Meanings of Words, Sentences, and Ideas in a Text

It involves Text-focused Strategies for processing information in the text, Marking and Annotating in forms of notes, Bridging Inferences of concepts and ideas, Close Reading to analyse the different parts of the text, and Using Text Structure to build representations of text content.

1.5.2.1. Text- focused Strategies

The simplest strategy to use when comprehension difficulties occur is rereading. Students reread a selection of text several times until they can read it smoothly, accurately, and with expression to become automatic in the recognition of words. It is an important *first* step to the use of more active strategies that facilitate reading comprehension. It helps in repairing the problems that students may encounter by reprocessing the part that causes the problem.

In addition, paraphrasing or rewording is an important strategy. By paraphrasing, we mean rewording particular parts of the text using different words that are more familiar to the reader. It is the process of identifying, recording, and writing the most important information from a text into your own words. These techniques are valuable methods of getting comprehension of what has been read. These techniques improve students' reading performance as they engage readers in close reading, rereading to better understand every word and every sentence and the relation between sentences.

Chunking sentences is another text-focused strategy which enables students to break down sentences into short and meaningful phrases. By so doing, readers can understand long and complex sentences.

1.5.2.2. Marking and Annotating

Annotating the text and taking notes can be a key to monitoring comprehension for information cited in the text. It may take different forms including citation of facts, summaries of important information, quotations and nonlinguistic forms, such as, sketches. To benefit from this strategy in increasing comprehension, notes should be produced in a way so that they are meaningful to the readers and can be reviewed.

1.5.2.3. Bridging Inferences

Inferencing is "making use of syntactic, logical and cultural clues to discover the meaning of unknown elements" Grellet (1981, p.14). To state it differently, inferring is the process of reconstructing the writer's unstated presupposition and draw conclusions from the facts stated in the text. Actually, it is a 'tricky' skill, as Nuttall (1982) describes it, where readers make predictions, draw conclusions, and make judgments to create a unique interpretation of a text (Bindon & Santeusanio, 2006).

This strategy helps readers to a large extent in building comprehension of the text both explicitly and implicitly. In other words, making inferences allows students to move beyond the literal text and to make assumptions about what is not openly stated in the text. In order to effectively infer a piece of information, students should make use of information taken from a text and add their own ideas and knowledge.

On the other hand, the ability to make connections among key concepts, arguments, and theories instead of processing concepts in isolation is an important strategy for increasing comprehension. This strategy enables readers to build a clear global representation of the text by linking information from different parts of the text.

1.5.2.4. Close Reading

Guided close reading refers to the use of guides to closely examine the meaning of words, sentences, and paragraphs and to examine the semantic, syntactic, and stylistic nuances of language. Close reading is a complex process as involves, more than understanding the single printed words, an insightful understanding of the language used.

Close reading method is used to pay attention to the surface linguistic elements of the text, including aspects of vocabulary, grammar, and syntax and to the semantic processing of text contents, in particular exploring the meanings of words and

relationships between word meanings. In addition, readers can use close reading to note the relationship of elements of the text to things outside it, such as pieces of writing by the same author or other writings of the same type by different authors.

1.5.2.5. Using Text Structure

The awareness of text structure is important when dealing with different text types and genres. For each style of text, there exists different text structures that dictate strategies to use to achieve comprehension. Understanding the text structure and organisation enables readers to make links between ideas and information in the text. The structure helps the reader organise the content because it contributes to the building of a mental representation of text content (See sections 1.3.2.2. and 1.3.2.3).

1.5.3. Strategies That Go Beyond the Text

These strategies are based on knowledge and experience. This category includes strategies like: question generation, think aloud, and visualisation. Using prior knowledge is particularly important for comprehension and learning from texts because authors always assume a certain amount of reader knowledge in describing the intended situation. Besides, relating the text content to what one already knows is an important aspect of comprehension.

1.5.3.1. Generating Questions

Asking questions is very influential on reading comprehension as it serves multiple purposes. Before reading it helps in activating prior knowledge and in clarifying what is not understood. During and after reading, generating questions is seen as self-testing. Question generation also induces the reader to go beyond the text.

Generating questions forces the reader to think about what is already known and what needs to be learned from the text.

1.5.3.2. Think Aloud

For the think-aloud strategies, using McNamara et al. (2007) words, they refer to "verbal expression of the normally covert mental processes in which readers engage when they are constructing meaning from text" (p. 483). This strategy helps readers to relate the text content to what one already knows which facilitates text processing of the text. This metacognitive awareness is a crucial component of learning, because it enables learners to assess their level of comprehension and adjust their strategies for greater success.

1.5.3.3. Visualisation

Another useful technique of going beyond the text that encourages readers to use to employ their prior knowledge is visualisation or imagery. This strategy is a useful in remembering and comprehending the text content. Role playing and manipulating objects to re-enact the text may be the first steps toward the processes of visualisation exemplified in experience. The central claim of the embodiment assumption is that symbols and language are grounded in action. In other words, comprehension and memory should normally improve when readers are able to experience or act out the information reported in the text; grounding the text into real experience helps readers form a more complete situation model.

1.5.4.Strategies to Organise, Restructure, and Synthesise the Text Content

Readers always need strategies of organising content text. A well-organisation of information helps readers in having a good presentation of the overall text content. For every purpose or goal the reader has, there is a specific organisation of information. In this respect, graphic strategies and reading guides are the common techniques to schematically organise the text in a meaningful way.

1.5.4.1. Summarising

Summary writing is another technique that engages readers in a deep comprehension. Similar to paraphrasing, summary writing is about using the reader's own words and expressions to restate text content. This technique aids readers to pay attention to every part of the text and discriminate information.

Readers engage in the comprehension process by constructing a text-based representation of the selection they are reading; they process the individual elements and integrate them for inter-sentence consistency; they mentally summarise all of the elements into a gist and construct a situation model.

1.5.4.2. Graphic Organisers

Graphic organisers are effective strategies to promote reading comprehension. It is a reading strategy that helps the readers present information in a linear fashion. Graphic organiser is a "diagram that represents a relationship directed by a thinking-skill verb" (Sam & Rajan, 2013, p. 156). The graphic representations highlight the relation between the important concepts and ideas in the text. They facilitate understanding of knowledge when there is a large amount of information, ease comprehension and retention of the subject matter of the text, within a given period of time (Jiang & Grabe, 2007).

Graphic organisers can be used at three levels: before instruction, during instruction and after instruction. Before instruction, graphic organisers are used to

understand the level of the students in terms of the content. During instruction, graphic organisers allow students to approach the content cognitively because they assist thinking. They also allow students to construct maps that are appropriate to their learning styles. After instruction, they help students as a summarisation tool or technique and they help the students understand their improvement in terms of understanding passage (Sam & Rajan, 2013).

Another classification of strategies is suggested by Mokhtari and Reichard (2002) which covers three sub-categories: Global Reading Strategies, Problem-solving Reading Strategies and Support Reading Strategies. The first category includes the strategies that enable readers have a global analysis of a text; evaluate or ignore what to read, note text characteristics, guess what the material is about, to mention just a few. These strategies can be thought of as generalised, intentional reading strategies aimed at setting the stage for the reading act.

The problem-solving strategies are, as their name indicates, those strategies used by readers to solve problems encountered while reading; for instance, re-reading for better understanding, going back when losing concentration, pausing and thinking about reading. Simply, these strategies are used when difficulties and problems of understanding surface. They help learners go through the text skillfully. The third category includes support reading strategies that aim at sustaining responses to reading. Taking notes, circling or underlining information, using reference materials are common strategies that supply the support instruction to readers.

To end up, what is more important than knowing the reading strategies is to know how to use reading strategies successfully and be able to apply them interchangeably (Munsakorn, 2012). The aspect of choosing the appropriate reading strategies is very important for readers, yet it is ignored by many EFL teachers.

1.6. Modes of Reading

Oral reading and silent reading are two modes of reading which are directly linked to fluency development. Regardless the strong and weak points of each, both modes of reading are parts of the educational practices of reading in many reading programmes. Presently, we will discuss some of the uses and preferences of each mode.

1.6.1. Oral Reading

It is also referred as reading aloud. It is defined as "the ability to read with accurate word pronunciation, at a reasonable rate, and with proper phrasing (prosody) that reflects a meaningful interpretation of the text" (Taylor & Rasinski, 2011, p. 108). Reading aloud is characterised, as Kailani (1998) states, by "clear articulation of words, flexibility in rate, volume and tone, adequate phrasing and effective use of pauses" (p.281). Reading aloud is a useful skill for improving students' command of oral communication which increases their confidence and motivation in learning.

Generally, it is related with beginner readers and the early stages of reading in Native Language (NL) where readers focus on translating the printed script into meaningful words. It is also linked to the early stages of learning English as FL where teachers read aloud to help readers discover units of meaning that should be read as phrases rather than word by word and helps them see reading as a continuous meaningful process of building larger units (ibid, 1998). Oral reading deals with surface structure of the reading skill that focuses on language which helps in grasping meaning. Lems, Mill, and Soro (2010) listed many investigations that proved the strong correlation between oral reading and reading comprehension. In the same vein, Alshumaimeri (2011) presents a wealthy discussion on oral reading and comprehension.

He summarises different studies and investigations on oral reading and comprehension in FL which recommended oral reading in class for a myriad of reasons:

- Oral reading helps in teaching and practicing pronunciation, intonation and even punctuation.
- It is useful in diagnosing pronunciation problems, and practicing speaking.
- It enables readers to boost their comprehension by making students aware of the role of reading large meaningful units of the text and considering it with different levels of meaning in achieving higher level of comprehension.
- Oral reading is helpful for poor readers to improve their literal comprehension in class.
- It offers better learning for readers with opportunities for errors, pauses, and interruption.

However, according to Been (1975), reading aloud should be discouraged as soon as readers achieve the mechanics of reading. He believes that it is time consuming as it slows down reading forcing the student to focus on each word. This slow reading leads student to focus their attention on every detail and thus, run the risk to, lose the overall picture. Besides, the students' mispronunciation of words lead to teacher's interruption of reading to correct miscues which make the assessment of FL reading comprehension through oral reading problematic (Lems, Mill, & Soro, 2010).

1.6.2. Silent Reading

Silent reading refers to that reading without labial movements or the vibration of vocal cords (Alshumaimeri, 2011), which is seen as an important type of reading. According to Taylor and Rasinski (2011), silent reading "is the ability to read with sustained attention and concentration, ease and comfort, at adequate silent reading rates (for various grade levels), and with good comprehension by the reader" (p. 108). Basically, silent reading is central in class activity, in every reading lesson, where

readers are asked to read a self-selected material for a particular fixed period of time either for information or for pleasure (Grabe & Stoller, 2002).

As a matter of fact, reading silently is generally practiced in intermediate levels onwards, after students have been equipped with some abilities through reading aloud; it is seen as a necessity for higher education success (Broughton et al. 1980). Silent reading is helpful in both time-saving and energy –saving, increasing individual interest while reading and boosting students' concentration which result in improving students' comprehension.

In short, oral and silent reading employ many of the same skills of reading, there are pronounced differences that must be considered as well as the effect of oral reading on silent reading behaviour (Taylor & Rasinski, 2011). Furthermore, it is obvious that oral reading can assist silent reading when there is a balance of practice in both oral and silent reading.

1.7. The Importance of Reading for FL Learners

Reading is proved to be the most important skill (Al Mutawa & Islam, 1994; Mustafa, 1998). Actually, there is no denial of the benefits of reading for FL learners in enriching vocabulary, practicing grammar, enhancing the writing skill, improving pronunciation, enlarging knowledge, and offering relaxation. Krashen (2004) assumes that practicing reading is a powerful tool to impetus reading skill, writing skill, vocabulary, and spelling.

1.7.1. Improving Pronunciation

Kailani (1998) believes that reading aloud in the FL is an excellent way for students to improve their pronunciation if using it as a pronunciation exercise rather than a comprehension activity. Through reading aloud, readers are allowed to diagnose

difficulties in word recognition skills and learn more about stress, intonation, juncture, rhythm, tone which, in fact, could not take place without the full understanding on the part of the student. In the same line of thought, Koda (2005) states that "phonological decoding is perhaps the most indispensable competence for reading acquisition in all languages" (p. 34). Actually, phonological decoding is emphasised by Lems, Mill, and (2010) as an important aspect of reading success that can be, at the same time, practised through oral reading particularly for beginning readers. They add that rehearsal not only solidifies the word in long-term memory through visual and auditory repetition but also helps retrieve it from working memory as well.

1.7.2. Enriching Vocabulary

Research on reading has proved that reading is an excellent opportunities to acquire and consolidate vocabulary (Parreren, 1989), as it allows learners to meet many words in different contexts of use. Facing the same word in different readings enables readers to increase sight vocabulary, as Coady (1979) mentioned, which in turn helps in better remembering words and in retaining them. More interaction with texts helps learners in learning spelling, defining, and using appropriately a considerable amount of words. All researches on reading devote long sections and even whole chapters on the efficiency of reading in learning new vocabulary. Reading plays a significant role in vocabulary acquisition which leads to academic success as readers gain a vast vocabulary repertoire and about their use in different contexts.

1.7.3. Practicing Grammar

Reading is of great importance in language learning process and it contributes in the acquisition of linguistic knowledge as it helps in understanding the mechanics of English grammar (syntax and morphology) (Perfetti, 2003). Reading enables readers to

learn more about the grammatical system of English when using texts as linguistic objects and following the grammar-oriented method in teaching. Readers try to examine and analyse the grammatical aspects of the text which result in getting grammar rules points. In intensive reading activities, the text is a reading material which is used as an example of grammatical and lexical elements.

1.7.4. Enlarging Knowledge

Learning the habit of reading will enable the learners to be always updated in their field of study and even in the other fields. Reading is a means for broadening one's academic scopes and gaining knowledge. In extensive reading, learners widen their knowledge about everything in the world, in particular, their general culture. Such knowledge could be used in another reading as well as they could be used in writing and speaking (Kailani, 1988).

1.7.5. More Relaxation

Reading not only provides a real pleasure for many students but also a deep relaxation. It is regarded as an adventure as the reader goes on the journey with the author. For that, reading is really an important habit that learners at all levels should have as it represents an important leisure-time occupation (Brusch, 1991). Many people spend long hours reading because they believe it is a leisure activity. According to Krashen (2004), there is strong evidence that free voluntary reading is very enjoyable. Actually, reading is exercise for the brain that stimulates and causes us to learn and get excited about new information, thus, reduces stress.

1.7.6. Enhancing Other Skills

It has been proved in the literature that reading contributes strongly in developing the language skills involving writing and speaking. There is a close and complex

relationship between writing and reading (Lems, Mill,& Soro, 2010). The interaction between reading and writing is a result of the similarities between the two complex processes which are centred around written language. As far as speaking is concerned, it is assumed that the development in spoken language influences development of reading. In addition, developing stronger reading skills, they further enables the development of more sophisticated speaking skills (Baker, 2014).

Conclusion

In this chapter, we tried to shed some light on the basic aspects that characterise the reading skill in the FL, including definitions, variables affecting it, models, modes and strategies adapted by students. Despite the variety of versions in defining reading, this skill is seen as a complex process that is basically twofold: the reader and the text. During the process of extracting meaning, both reader's various characteristics namely language proficiency, attitudes, motivation, and background knowledge, and text's various characteristics text type, organisation, topic, linguistic features all contribute in shaping the nature of reading depending on their interaction with each other. To explain such interactions, different reading models as top-down, bottom-up, interactive, just to name some, were covered. Another aspect which is explained is silent and aloud reading which represent the mode in which reading can take place either inside or outside the classroom with some of their advantages and disadvantages.

Chapter Two

Teaching Reading in a Foreign Language

Chapter Two

Teaching Reading in a Foreign Language

Introduction

This chapter introduces all about teaching reading to FL learners. First of all, it presents the intensive and extensive approaches to teaching reading for FL learners. In addition, it attempts to discuss the four approaches in designing reading courses including the classroom procedure in teaching reading. Then, it highlights the different reading purposes that learners have. It also tries to discuss in detail the different aspects underlying the use and selection of the reading materials. Furthermore, it sheds some light on the students' reading comprehension problems and difficulties. Finally, it addresses an important issue in teaching reading, reading assessment, with a focus on the different types of assessments and the various types of questions.

2.1. Approaches to Teaching Reading

2.1.1. The Intensive Approach

Intensive reading is reading for the sake of learning from the text or read to learn generally something on and about the language namely new words, grammar, or text organisation. (Broughton et al.,1980). Intensive reading refers to the typical reading that takes place in classrooms where learners are asked to understand short passages under the teachers' guidance, supervision, and support. Basically, the intensive reading lesson is intended primarily to train students in reading strategies (Nuttal, 1982). It involves approaching the text under the close guidance of the teacher, or under the guidance of a task which forces the student to pay great attention to the text. The aim of intensive reading, as Nuttal (1996) explains is to arrive at a profound and detailed understanding

of the text: not only of what it means, but also of how the meaning is produced. The 'how' is as important as the 'what'. It focuses on content study, linguistic study and results (comprehension) with a little emphasises to the skills involved. Intensive reading has two goals: comprehension of the text and giving attention to language features in each text (Carrell & Carson, 1997).

For Nation (2009), the intensive reading course should focus on many aspects mainly:

1. *Comprehension*. Intensive reading can aim at understanding a particular text.

2. *Regular and irregular sound-spelling relations*. This can be done through the teaching of phonics, through teaching spelling rules, and through reading aloud.

3. *Vocabulary*. Learners' attention can be drawn to useful words, and the underlying meaning and use of these words can be explained. Words from the text could be assigned for a later study.

4. *Grammar*. Difficult grammatical features can be explained and analysed.

5. *Cohesion*. Learners can practice interpreting what pronouns refer to in the text, what the conjunction relationships between sentences are, and how different words are used to refer to the same idea.

6. *Information structure*. Certain texts contain certain kinds of information. Newspaper reports, for example, can describe what happened, what led to the happening, what the likely effects will be, who was involved, and when and where it happened. Learners can be helped to identify these different kinds of information.

7. *Genre features*. The vocabulary, grammatical features, cohesive features and information all contribute to the communicative effect of a text. Intensive reading can focus on how the text achieves its communicative purpose through these features and what this communicative purpose is.

8. *Strategies*. Intensive reading can be used to help learners develop useful reading strategies. By working intensively on a text, learners can practise the steps in guessing from context, using a dictionary, simplifying difficult sentences and taking notes

Focus	Items	Strategies
Comprehension	Question types Question forms	Predicting Standardised reading procedures
Sound-spelling	Regular sound-spelling correspondences	Spelling rules Free/checked vowels
Vocabulary	High frequency vocabulary Underlying meanings of words	Guessing Noting and learning on cards Word parts Dictionary use
Grammar and cohesion	High frequency grammatical features	Dealing with sources of difficulty (clause insertion, what does what?, coordination, cohesion)
Information content	Topic type constituents	Topic type
Genre	Features that typify this type of text	Generalise to writing

Figure 05. Useful focuses in intensive reading (Nation, 2009, p. 26).

In applying intensive reading, teachers should ask "How does today's teaching make *tomorrow's* text easier?" (Macalist, 2011). In so doing, teachers need to: *1*.Choose and emphasise on the items that occur with high frequency in the language as a whole. Such items will occur often in many different texts. *2*. Focus on strategies that can be used with most texts. *3*. Quickly deal with or ignore infrequent items. *4*. Make sure that the same items and strategies get attention in several different texts.

In short, an intensive study of reading texts can be a means of increasing learners' knowledge of language features and their control of reading strategies. It can also improve their comprehension skill.

2.1.2. The Extensive Approach

In the extensive approach to teaching reading, learners read large quantities of materials in the FL for having a global understanding and for enjoyment in the first

place (Day & Bamford , 2004). In other words, extensive reading is intended to get the reader to focus on reading for the sake of reading (for information or entertainment), and less on reading for the sake of mastery of a particular linguistic structure or a particular reading strategy. Most of the extensive reading is done outside the classroom, yet, it can be introduced to any kind of EFL class provided that students already have a basic knowledge of foreign language (Mason & Krashen, 1997).

Extensive reading aims at training students to read fluently in the FL without the teacher's support; as Nation (2009) states, it fits in the meaning-focused input and fluency development. For that, teachers should throw light on the students' ability to comprehend texts rather than guiding them to comprehension of a text. In this respect, Grabe and Stoller (2001) believe that exposing students to large amount of texts should be a central component of any course that aims at building academic abilities. In such an approach, readers have the necessary freedom to choose their own reading materials. Besides, they are not only encouraged to read as much as they could but also they are encouraged to stop reading if the material is not interesting or too difficult for them. However, extensive reading contributes effectively in expanding the students' vocabulary repertoire and promoting their proficiency development (Carrell & Carson, 1997).

To sum up, the extensive reading course is based on some principles such as using easy materials, choosing a variety of materials on a wide range of topics, giving learners the freedom to choose materials (self-selection), practicing reading as individual and silent activity, and finally, encouraging fluent reading for pleasure.

From what is said above, both intensive and extensive readings are complementary and necessary in teaching reading for FL learners. Students are more concerned with language items and reading skills and strategies in intensive reading and

are concerned with practicing these linguistic items developing such strategies in the extensive reading.

2.2. 'Top Ten' Principles for Teaching Reading

With the purpose of making the teaching of EFL reading effective, teachers regularly need "to take stock of their perception or the nature of the reading process itself, relevant reading activities, and appropriate classroom management" (Williams, 1986, pp. 42-45). This section puts forward ten principles for teaching foreign language reading which were introduced by Williams (1986). Those are important to evaluate the successful reading strategy. The principles are:

1.In the absence of interesting texts, very little is possible. Reading is a source of learning and a source of enjoyment (Nation, 2009). Choosing interesting texts is an important obvious principle and a neglected one in many FL classrooms. Interest fuels the learners' motivation, which is considered as an important text variable that affects reading in a FL, for example, it has a sound influence on the reading speed and fluency. It is important to note that texts should not only be interesting for learners but preferably to the teacher as well.

2. *The primary activity of a reading lesson should be learners reading text*. Teachers should keep in mind that reading is the central activity when reading, as a single-skill is given emphasis. As a matter of a fact, some teachers use other activities as listening and writing which submerge the main activity; this does not mean that these activities are not important, but teachers should know well that learners learn to read by reading itself, there is no other way.

3. *Growth in language ability is an essential part of the development of reading.* Recently, emphasis was given to teaching and developing the appropriate skills and

strategies. However, teachers should bear in mind that even readers equipped with the best skills will not be able to read effectively unless they have an adequate vocabulary repertoire and sufficient knowledge about sentence pattern and 'rhetorical patternings' in the text. Without these kinds of knowledge, a minimum language threshold (Alderson, 1984), all their skills and strategies 'will have little effect' or will not operate successfully.

4. *Classroom procedure should reflect the purposeful, task-based, interactive nature of real reading.* Reading is an active interaction between the reader and the text where readers are actively engaged in constructing the message transmitted by the author. Moreover, it is a psycholinguistic guessing game as described by (Goodman, 1967); readers are forming hypothesis and prediction and looking for confirmation all the way long to achieving the meaning. To foster this interactivity in a reading classroom, teachers should encourage pair work and group work because it is through classroom procedures, inter-learner discussion of the text and associated tasks required for the development of that their reading skills can actively be generated. This essential interactivity also encourages learners to make use of what they have read. This can be done by requiring the completion of a diagrammatic representation of the text-matrix, flow chart, tree-diagram, and the like. Teachers should not forget that purposeful, audible interactivity of this nature replicates the interactivity which is characteristic of the efficient, individual, silent reader.

5. *Teachers must learn to be quiet: all too often, teachers interfere with and so impede their learners' reading development by being too dominant and by talking too much*. It is important to note that reading is an individual skill, which fostered by collaborative group work that has to be practiced under guidance, the encouragement, and the goals of the teacher. The teacher's role, then, is "less that of information-giver/text-explainer,

and more that of coach/classroom organiser/ trouble-shooter/consultant/personnel manager/catalyst" (Willians, 1986). There is enormous satisfaction to be gained from assisting learners with their own particular difficulties, seeing them progress at their optimum rate, and observing the pleasure that learners derive from understanding and enjoying a text when more of the responsibility for learning is placed on *their* shoulders-where it properly belongs. So, teachers should act like guides, learning-managers, under whom students will develop their individual reading skill.

6. *Exercise-types should, as far as possible, approximate to cognitive reality*. Teachers need to create more appropriate exercise-types that go with the purpose of teaching reading that is; making learners more efficient readers. They need to identify the strategies, skills, and objectives during the process of real reading and help the learner to acquire them. Investigations on self-report, self-observation and think aloud should be focused as they throw very interesting light on these aspects of teaching reading.

7. *A learner will not become a proficient reader simply by attending a reading course or working through a reading textbook.* There should be a balance in the reading syllabus; learners should give equal importance to both intensive and extensive readings. For example, for every hour of intensive reading, a learner should have another hour of extensive reading regardless what they read.

8. *A reader contributes meaning to a text.* The meaning is not lying in the text waiting to be passively absorbed by the reader (Nuttal, 1982), rather one has to try to 'open up' a text by bringing meaning to it (Klapper, 1992). Reading is not simply a matter of taking out information, opinion, enjoyment, etc, from a text; however, it involves an active contribution of attitudes, experience, pre-knowledge, etc. Teaching reading in EFL should encourage this natural characteristic by including questions or tasks which require readers to combine what is in their heads with what is in the text.

9. *Progress in reading requires learners to use their ears, as well as their eyes.* Learners should be encouraged to listen to texts such as tapes accompanying graded reading, the teacher reading to the class, older learners reading to younger learners, and good readers reading to weaker readers. Audible reading and silent reading help readers in developing their stress and intonation or prosody.

10. *Using a text does not necessarily equal teaching reading* There are different purposes for which texts can be used, appropriate and suitable texts should be chosen for the learners, in a reading class depending on the objectives and the priorities of the teacher: reading skills and not language skills. In the same vein, Johns and Davies (1983) make a clear distinction between what they call TALO (text as linguistic object) and TAVI (text as vehicle for information). In TALO, the text is a means for the teaching of language, namely, grammar, vocabulary, etc., that has very little to do with the development of learners' reading skills. On the other hand, in TAVI, the text is used for the sake of developing given cognitive strategies of meaning-reconstruction to obtain the meaning of any text they study in or outside the classroom.

2.3. Approaches to the Design of Reading Courses

There are different approaches to designing reading courses in English as Foreign Language; Bloor (1985) suggested four isolated approaches.

2.3.1. The Psychological Approach

Courses following such an approach basically focus on providing exercises and activities that train natural reading processes and reading skills. Generally speaking, the focus is on the processes that take place in the readers' mind which are actually hard to investigate or observe. According to Bloor (1985), training students to usually operates

at two different levels: at the level of simple word recognition (the graphic- phonic relationship) and at the level of interpretation (the syntactic-semantic-pragmatic relationship with the text). In such a course, the input is on the graphological form of words and at, and in few cases to meaning.

Generally speaking, the mental activities designed are designed to help readers learn to read. Recognition of visual input is the ability that involves relating the printed words to their corresponding meaning which is seldom used in FL classes where more complex activities to raise the students' awareness of reading process are suggested. These activities and skills involve interpretation at sentence and paragraph levels and the reader's existing knowledge. Such activities include inferencing that is manipulating ideas and information. To illustrate this approach Bloor, (1985 PCIT) lists some examples from Morrow (1980) *Skills for Reading* and *Reading and Thinking* series.

2.3.2. The Linguistic Approach

In contrast with the psychological approach that focuses on the reader, the linguistic approach focuses on the text and its language. This approach is based on the assumption that handling the linguistic features of the text is a reason for the improvement of reading ability. No textbook or course book is exclusively linguistically-oriented, yet there is a large proportion of language-centred activities. Such approach gives more importance to grammar and vocabulary activities rather than meaning. Due to the significant role of language competence in developing the reading ability, tasks of this approach are always present in the other approaches.

2.3.3. The Content-oriented Approach

Courses of this approach are governed with purposes of reading. Content-oriented reading enables readers to specify their purposes in reading, thus more efficient in

reading. It focuses on the information in the text not the linguistic aspects or the recognition of forms. Ultimately, the activities are purpose-directed; i.e. teachers ask students to read for the purpose of extracting information or to perform operations with information from the text. It is important to note that teachers should stem the purposes from the learners' own needs and purposes, particularly for ESP learners. As far as texts are related to their subject matter, readers will approach the text with purpose and interest.

2.3.4. The Pedagogically- oriented Approach

It refers to the approach that focuses on theories of motivation in designing the total course not the individual activities. The more learners contribute to the selection and control of the materials the more successful reading will be. This approach is exemplified by the self-access materials, form which learners make their own choices and work on their own pace (Jordan, 1997). In other words, following this approach, teachers should provide learners with a set of materials to choose from according to they want to read.

2.4. Procedures for Teaching Reading: Classroom Activities

Classroom activities are the pillars of teaching reading. The purpose behind designing classroom activities is increasing students' engagement with reading that fits their purposes in reading and the text's genre and content (Nuttal, 1982). Designing the appropriate activities helps readers to perform the designed purposes and achieve the goals to read effectively. These activities that make up the procedure in teaching reading are grouped by Wallace (1992) into the following: pre-reading, while-reading, and after-reading activities.

2.4.1. Pre-reading Activities

They are also called ‘warm-up’ or ‘before reading’ activities as they introduce the text to students. Simply, they consist of questions that precede the text and need to be answered by readers (Wallace, 1992). These activities aim at helping the reader to be less dependent on the text words and more dependent on strategies that go with their purpose in reading. Besides, they minimize the effect of lack of proficiency (Nuttal, 1982). In simpler words, pre-reading activities may direct the students’ attention to linguistic, cultural, conceptual difficulties they may encounter while reading the text, activating their schemata.

The goals of pre-reading stage are to activate the students’ knowledge of the subject, to provide any language preparation that might be needed for coping with the passage and, finally to motivate the learners *to want to read the text* (Celce-Murcia, 1991). Pre-reading activities are of a high importance because they encourage readers to have a critical procedure towards the text through raising many questions this suggest different purposes of reading or ways of approaching the text.

As a rule, pre-reading activities include discussing author or text type, skimming and scanning, and brainstorming which the most popular one. They are, in fact, not only concerned with raising the students’ motivation and interest to read the text presented but also with anticipating language difficulties (Wallace, 1992). These questions aim at making students aware of the way language is used to convey meaning, the questions are not necessarily different from questions in tests, but their purpose and the way they are used is quite different.

With regard to the importance of such activities, a careful attention should be given by teachers and to make readers aware of its importance in making what is coming in the next step well received mentally. One way of facilitating a reader’s interaction with

a text for building background knowledge is through pre-reading activities (Hudson, 2007). Pre-reading activities provide orientation to content and context. Pre-reading activities provide the reader with the necessary background to organise activities and to comprehend the material pre-reading activities, elicit prior knowledge, and focus attention (Alemi & Ebadi, 2010).

Explicit vocabulary development and pre-reading activities are very useful when the text or content can be specified. However, what is also required for teachers is to ensure that students use appropriate strategies to increase their recognition vocabulary when confronted with unfamiliar texts. Tudor (1989) states that for the ESP teacher, a popular approach to this problem is to pre-teach the vocabulary required for a specific text. Vocabulary pre-teaching is only one of the possible ways in which the ESP teacher can assist in the activation of appropriate content schemata so as to improve the student's comprehension of texts.

2.4.2. While-reading Activities

They refer to 'during' or 'through' reading exercises. While reading activities aim "to encourage learners to be flexible, active, and reflective readers" (Wallace, 1992, p.93). Basically, these activities aim at increasing the interaction between the reader and the text, how meaning is built up throughout the text, help students understand difficult vocabulary, and help students with style and literary language (Hedgcock & Ferris, 2009). At this stage of reading, readers are encouraged to develop their reading strategies and skills as 'guessing' to build meaning from the text. In this respect, Grellet (1981) lists some activities which can be done in pairs or in groups such as: guessing word meanings by using context clues, word formation clues, or cognate practice; considering syntax and sentence structure by noting the grammatical functions of

unknown words, analysing reference words, and predicting text content; reading for specific pieces of information; and learning to use the dictionary effectively.

Although, these activities are time consuming in preparing and few are not natural as they interrupt the flow of reading, they must be an essential part in the during reading stage for the benefits they offer. Flexibility is gained from such activities as a result of the interaction between the reader and the author. Using context and word clues to learn how meaning accumulates throughout the text, for that, the activities in this stage should be designed according to the level and standard of the students. While-reading activities prepare students for the next stage.

2.4.3. Post- reading Activities

Post-reading activities refer to the tasks that follow the text. These activities are generally designed to evaluate what the teacher has taught in the while-reading stage and to evaluate the output and feedback from students. In other words, through such activities, teachers can gather information about students' reaction to the text; if they liked it or not, if they find it useful or not, if they leant something from it or no, etc.

Similarly, post-reading activities are mainly controlled by the text genre, the context of learning and the learners' purpose for reading. The while-reading phase is significant and the most active stage among the three because the activities help readers in grasping the writer's purpose, understanding the text structure and clarifying text content. Multiple choice questions are regarded as the frequently used type of questions which need no reference to the text while answering.

2.5. Purposes of Reading

People read for a variety of purposes. These purposes differ from one text to another and from one person to another depending on their opinions, backgrounds,

experiences and schemata. However, these purposes can be gathered under two main broad purposes: reading for pleasure and reading for academic purposes.

2.5.1. Reading for Pleasure

Reading for pleasure covers the non-academic reading, it refers to the reading one does for enjoyment. Readers usually read what they like, what they enjoy, or at least, what they hope to enjoy. Seeking pleasure from a text makes readers eager to read more and more which ultimately helps them develop the overall skills in reading in FL. In fact, pleasure is an important aspect that should also be present in reading for academic purposes; yet, this principle of pleasure is unfortunately neglected (Nuttall, 1982; Wallace, 1992). The pleasure enables students to enjoy reading in the foreign language and ultimately it increases their reading fluency.

2.5.2. Reading for Academic Purposes

Reading for academic purposes refers to the readings that involve the understanding of different passages to answer a variety of questions and tasks. In fact, reading for academic purposes can be for two major purposes: information or meaning.

2.5.2.1. Reading for Information

Most reading is done for the purpose of gathering information. In simpler terms, it refers to reading to collect information from anything written. Reading for information in English is one of the most important purposes particularly at tertiary education. According to Grellet (1981), one generally reads to find out something or in order to do something with the information he gets. Learners always have questions in mind and they read in an attempt to have answers for these questions. A reader reads a

text to understand its meaning, as well as to put that understanding into use. In this respect, Grabe (2009) lists five further major purposes:

1. Reading to search for information (skimming and scanning)
2. Reading for quick understanding (skimming)
3. Reading to learn.
4. Reading to integrate information
5. Reading to evaluate, critique, and use of information (p. 7).

- *Searching for information:* Readers in most, if not all, academic settings read for locating specific information. Both scanning and skimming are important processes that facilitate the task of looking for information. Combining both skimming and scanning can help readers to focus on the main idea and supporting details as well ultimately decide for the usefulness of information of the text.

- *Read to learn:* It is assumed that reading correlates with learning. Learning is a natural by-product of reading. Generally, readers learn the information that are highlighted as important. Readers are expected to remember and recall the information learnt because they will be needed later or used in some other tasks. Learning serves the wider role of extending the readers' general knowledge (Wallace, 1992).

- *Reading to integrate information:* Readers generally synthesize and put together information extracted from different parts of long texts or from multiple texts.

- *Reading to evaluate critique and use information:* It means that readers highlight strengths and weaknesses, the most important and least important information and the main aspects of the text. It also involves relating text information to other texts' information and/ or to their background knowledge and beliefs.

2.5.2.2. Reading for Meaning

The most common automatic purpose for reading is comprehension. Reading is basically a matter of understanding the meaning the text conveys. Improving the

understanding is, in fact, fundamental to the other purposes. Without constructing meaning of the text, readers would not be able to get the information.

Actually, Nuttall (1982) has mentioned four consecutive categories of meaning:

a) Conceptual Meaning (The meaning of a word can have on its own; simply, it refers to what Saussure said about definition of language as a 'sign' system that includes 'signifier' and 'signified', *b) Propositional Meaning:* It refers to the meaning a clause or sentence carries on its own. This type of meaning can be understood without the reference to the context, *c) Contextual Meaning:* it is the kind of meaning that cannot be inherited unless the sentence or the proposition or the word is in its context), and *d) Pragmatic Meaning* (It is the meaning which a sentence has only as a part of the interaction between writer and reader. The interpretation of such meaning differs from one reader to another because every reader engages in the construction of meaning using his own individual concepts and experiences.

There are certainly other ways to classify purposes for reading the above list does not cover all the purposes. Davies (1995) summarises the reading purposes in five categories:

1-Reading for pleasure: It is generally concerned with enjoying sound and rhyme or rhythm of a literary text and following a piece of narration.

2-Reading for a general impression: It involves getting an idea of the writer's point of view, gaining an overall impression of the tone of a text, and deciding whether or not to read the text.

3-Reading for organising reading and study: Here, readers deal with the identification of important content of a text, answering specific questions and deciding on which section of a text to start studying.

4- Reading for learning content or procedures. It is basically about gaining comprehension of new concepts, getting information from the text and following instructions.

5-Reading for language learning: With this purpose in mind, readers try to interpret the text, literally and morphologically, to learn new vocabulary, to identify useful structures or collocations, to use the text as a model for writing and to practise pronunciation.

6- Reading for general comprehension: When accomplished by a skilled fluent reader, requires very rapid and automatic processing of words, strong skills in forming a general meaning representation of main ideas, and efficient coordination of many processes under very limited time constraints (Grabe & Stoller, 2002).

2.6.Reading Materials

In the literature, many theories have been proposed to explain the close relationship between the reading materials and the successful of the reading lesson. Selecting appropriate reading materials is a thoughtful process that involves active engagement of readers. For that, the selection of appropriate reading passages is one of the more complex tasks facing the EFL reading teacher (Richard, 1994).

2.6.1. Selecting Appropriate Materials

Many different criteria contribute in selecting the appropriate reading materials. According to Blachowicz and Ogle (2008), content, format, and language are all important elements for establishing whether materials are at an appropriate level of difficulty for a student in reading instruction. Indeed, "text materials should complement students' intellectual levels and be appropriate at level of difficulty" (Grabe & Stoller, 2001, p.190). Basically, text materials selected for each setting should be coherently linked (topics, tasks, and overall themes) (Grabe, 2001). The choice of the

appropriate text is very important in building up students' reading competence (Broughton et al.,1980).

In fact, materials have a major impact on students' motivation to read and their engagement with texts. The text is the core of the reading process, the means by which the message is transmitted from the writer to the reader. Text materials should complement students' intellectual level and be at the appropriate levels of difficulty assumed background, cultural assumptions, demanding topic grammatical complexity, length of the text, vocabulary, organisation and new conceptual knowledge (Grabe & Stoller, 2001). To start with Nuttal (1982) suggested the following criteria: the text's readability, suitability of content, and exploitability.

- ***Readability:*** Texts should be at the right level of difficulty for students. It is important to know the students' level. Knowing how much they know about language helps notably in selecting what is appropriate with their knowledge. Of course, teachers will never choose what matches all students' level, but at least the majority as no class is totally homogenous.

- ***Suitability of content:*** It is regarded as an important aspect in materials selection for both teachers and students. Suitable materials fuel students' motivation as it related to their needs.

- ***Exploitability*** It is "the ability to read"; how texts can be used to develop the students' competence as readers. Texts must be properly graded and sequenced and varied so that their linguistic content and cultural difficulty match the abilities and the sophistication of the students and answers a reasonable coverage of the various kinds of reading skills they need to develop (Broughton et al.,1980). Answering a variety of texts presentation is very important in making reading courses interesting, active and motivating.

In fact, selecting the reading material is one of the teacher's hardest tasks in EFL reading classes. Appropriate reading passages are essential for successful reading, yet many teachers rely on randomization in selecting and do not involve students while selecting. In this vein, Arias (2007) summarises what researchers have identified as factors that should be bore in mind when preparing materials for EFL classes. These factors are grouped as factors related to the students which include the students' level, interests, needs, and background knowledge and factors related to the text itself and it includes content, relevance and authenticity.

- ***Students' Level*:** Students' level is a significant aspect that teachers should bear in mind when selecting the materials for the reading class. It is very important to choose materials that are suitable for the students' level because having materials that go beyond or are under students' level can be counterproductive. Simplifying the materials is one possible way to provide learners with the appropriate reading passages (Alderson, 2000). Besides, there should be a grading in choosing the reading passages from the easy to the difficult. Yet, teachers should not neglect students' interests.

- ***Students' Interests**:* If teachers choose texts that are suitable for students' level and do not match their interests, reading, will for sure be a boring or a difficult activity. For that, teachers should always look for reading passages within students' interest area before estimating their difficulty. At the same time, they should always encourage students to reveal their interests which are regarded as the fuel for reading. We can hardly imagine someone reading and understanding something if he does not like it. In fact, knowing the students' interests is an important aspect in the reading selection process.

- ***Students' Needs***: Students' needs play a significant role in the process of selecting materials in the FL class. Teachers who are supposed to select materials

should have a clear vision on students' needs in order to help them fulfill their needs through the course content. To ensure the course success, teachers are asked to cover all the needs whether they are common (reading fast) or individual needs (Grellet, 1981).

- ***Students' Background Knowledge:*** Students' background knowledge is another significant criterion for selecting the appropriate materials for the EFL reading class. Research findings have emphasised the importance of considering this aspect in the material selection process as it may cause more difficulties for the FL reader than language complexity does (Alderson, 2000). In fact, it is possible to select unfamiliar texts if teachers provide learners with the needed information through pre-reading activities to facilitate the reading comprehension process by giving the students the background knowledge along with the reading material.

In the same vein, Hedgcok and Ferris (2009) add to the above criteria the following aspects: text length, visual information and comprehension aids to the criteria of selecting texts. It important to bear in mind, as teachers, the purpose is to improve the students' skill not discouraging them; thus, teachers should take into consideration the length of the text. Teachers need to find a balance between students' proficiency and prior reading experience, in selecting texts. The second is visual information and comprehension aids. Both verbal and nonverbal information can play a significant role in helping students while reading. Although these factors are not necessarily make-or-break aspects of text selection, they can help teachers assess the relative merits of competing texts they might be considering. Hedgcok and Ferris (2009) maintain that problematic aspects of texts revealed through text analysis may guide the teacher to provide further instructional support not eliminate the text.

2.6.2. Simplified Vs. Unsimplified Texts

To address the issue of which type of texts authentic or non-authentic that should be used in teaching reading for foreign learners, it is extremely important to have an overview on both types of materials and highlight the advantages and the disadvantages of each as they are reported in the literature.

2.6.2.1. Unsimplified Texts

Unsimplified or authentic texts refer to the texts written for non pedagogic purposes; i.e, they refer to the texts addressed to the native speakers whether for reading for pleasure or information. In other words, it is a text that originally created to fulfill a social purpose in the language community for which it was intended (Grellet, 1981). Introducing this type of material to FL language classrooms is determined with the teachers' purposes along with the texts' advantages and drawbacks.

To start with, let's look at the advantages of authentic texts suggested by Berado (2006):

- ***Exposing Students to Real Language:*** Authentic texts are seen as a solution to the restricted use of language only in classrooms which, in fact, do not represent a *"real-life"* situation. Using authentic materials in teaching reading is a golden opportunity for learners to be in direct contact with the real language use particularly of scientific and technical English. Most of the authentic materials are always up-to-date and constantly being updated which always satisfy the learners' inquiry for information. In this respect, Nuttall (1996) states that authentic texts are proof that the language is used for real-life purposes and by real people. Moreover, authentic texts allow learners to use functional language and see language in its entirety (Crossley et al.,2007).
- ***Relating more closely to students' needs and Increasing Motivation:*** Authentic materials are what students need and want in classrooms and will need and want to be

able to read when travelling, studying abroad, or using the language in other contexts outside the classroom (Berado, 2006). Besides, they enable learners to interact with the real language and content rather than the form; i.e, learners nor only engage with text but also with the writers purpose and objectives in writing. Such type of materials is a motivator for learners to develop their communication through developing reading which is considered as the medium between the reader and the author. Using authentic texts encourage learners to learn more about how language is used outside the classroom as far as these materials are within the students' ability. In fact, reading recent materials remains always a source of interest and motivation for readers which enables them to update their content knowledge and language as well. In this line of thoughts, Richards (2001) states that authentic materials have a positive effect on ESP/ EST learners' motivation because they are intrinsically more interesting and motivating than created materials.

- ***Supporting a more creative approach to teaching****:* Authentic texts can be used for many activities. Authentic texts provide wide choices concerning styles, genres, and formality. These texts can be used in a variety of ways to promote different skills. Crossley et al. (2007) encourage the use of authentic texts in FL teaching because they are more comprehensible as far as they are coherent which is determined with the cohesive devices contained in the text.

On the other hand, there are some negative aspects in the authentic materials. They can mainly be too culturally biased which demands a solid cultural background when reading (Berado, 2006); except, may be, for scientific and technical texts. In fact, authentic texts are culturally dense which increases difficulty for beginning and intermediate (Crossley et al., 2007). Besides, they often contain difficult language, unneeded vocabulary items and complex language structures, which can often create

problems for both learners and teachers (Richards, 2001). In this respect, teachers need to pick up the right text to avoid students' frustration and boredom.

Authentic Reading Materials

Advantages	*Disadvantages*
"Real" language exposure with language change/variation being reflected	Often too culturally biased, difficult to understand outside the language community
Students are informed about what is happening in the world	Vocabulary might not be relevant to the student's immediate needs
Textbooks tend not to include incidental/improper English and become outdated very quickly	Too many structures are mixed so lower levels have problems decoding the texts
The same piece of material can be used for different tasks	Special preparation is necessary, can be time consuming
Ideal for teaching/practising mini-skills-skimming/ scanning	Can become outdated easily, e.g. news stories, articles.
Contain a wide variety of text types, language styles not easily found in conventional teaching materials	
Encourage reading for pleasure, likely to contain topics of interest	

Figure 6. Advantages and disadvantages of authentic reading materials (Berado, 2006, p.65).

2.6.2.2. Simplified Texts

Simplified texts are those texts developed for pedagogical purposes particularly, as Berardo (2006) states that they are designed for language learning purposes for FL learners. Using simplified texts are more recommended to train readers on particular skills like skimming and scanning which are more effective for learners if they are practised on simple material. In both situations, simplifying texts is a solution to overcome the students' problems encountered while reading authentic materials. In addition, simplifying texts is based on students' level and mainly focuses on removing or replacing the difficult words or structures (Berado, 2006).

Introducing simplified texts to FL learners is beneficial in some situations. According to Crossley et al. (2007), simplified texts are often seen as valuable aids to learning because they accurately reflect what the reader already knows. Moreover, they are used for the purpose of illustrating specific language features. Crossley et al. (2007) believe that beginner FL learners benefit from texts that are lexically, syntactically, and rhetorically less dense than authentic texts

Although, Day and Bamford (2004) states that simplified texts are poorly written, uninteresting, hard to read, and can lack normal text features (eg.redundancy and cohesion), still they can be used in EFL reading classrooms. In their article, Crossley et al. (2007) claim that the only theory that Krashen's (1981, 1985) theory of comprehensible input maintain the use of simplified texts in FL environments The results of this study suggest that simplified texts provide EFL learners with more coreferential cohesion and more common connectives and rely more on frequent and familiar words than do authentic texts. The results further indicate that simplified texts demonstrate less diversity in their parts of speech tags, display less causality, depend less on complex logical operators, and demonstrate more syntactic complexity than do authentic texts. Finally, the results suggest that no significant differences exist between simplified and authentic texts in their abstractness and ambiguity.

In contrast, Berardo (2006) believes that non-authentic texts are artificial because they focus on particular aspects of language that have to be taught and often contain a series of *"false-text indicators"* such as the repetition of structures and the perfectly formed sentences, make them different from what the learner will encounter in the real world readings in how language is used. Simplification of authentic texts leads to a misleading idea of how a language is built up. In the same respect, Alderson (2000) believes that simplifying texts may lead to distorting the message or increasing difficulties in other text features. Earlier on, Grellet (1981) agrees that simplified texts are more difficult for FL learners because they contain a reduced number of linguistic and extra linguistic cues. Accordingly, the process of simplifying vocabulary and syntax might complicate the message of a text.

2.6.3. Texts: Linguistic Objects Vs. Vehicles for Information

As far the use of written texts in teaching reading in a FL is concerned, Johns and Davies (1983) emphasised the use of texts as vehicles for information rather than linguistic objects. Further, they made a clear distinction between the use of TALO (texts as linguistic object) and TAVI (texts as vehicle for information).

2.6.3.1 Principles Underlying the Selection of Texts

In selecting texts as linguistic objects, teachers focus on the syntactic structures and vocabulary to be learned each time. Accordingly, linguistic grading of the course is an important aspect by rewriting or adapting texts. Since the core of the course is language, subject matter is of a secondary importance rather than the information or meaning and gets little importance, texts are of a 'general interest' in the subject area. Texts are generally chosen to be comprehensible not only for students but also for teachers to fit their knowledge in the field of speciality.

Concerning texts as vehicle for information, the selection is based particularly on the purpose of learners if it is deferred or immediate; which in turn depends largely on the students' needs and tasks. In fact, the selection is made by the students or by the subject teachers because they need texts with value; match students' speciality. To keep students motivation, teachers need to make the situation more concrete. This can be achieved by authentic texts which are graded according to the topic-type.

2.6.3.2. Preparatory Activities for Reading the Text

Unlike the TALO method, where no preparatory activities are used except the list provided for translation which include the vocabulary selected to be learnt, the TAVI method employ various preparatory activities; comprehension questions before reading,

a quiz of pre-questions on the subject matter particularly asking questions about information that do or do not exist in the text, to name but these. Better still, many other possibilities can be employed as far as the activities that awaken interest and establish purpose.

2.6.3.3. Work with the Text

Teachers following the TALO method work slowly through the text with an emphasis on the language rather on the information, on what is not known not what is known, on detailed elements not on the overall meaning, on the one hand. On the other hand, students are looking for precise answers for questions about detailed linguistic points; difficult syntax and lexis. After completing the discussion of the text, another discussion of meaning is raised. In interfering with information, students use different language learning strategies; less competent (non successful) learners tend to look up every difficult word in the dictionary whereas successful try to guess its meaning or skip it and attempting to generate the overall meaning.

However, in the TAVI method, the emphasis is given to the information in the first place and the overall meaning in the second place. Language and details are given very little importance, if not none. With this method, students already know what to look for in the text because of the pre-activities that serve as direction- finder. If students are faced with difficult vocabulary words or structures they are asked to guess the meaning from the context; in such situations, the use of the dictionary is mainly to check their guesses.

2.6.3.4. The Type of Teaching/ Learning Interaction Involved

There are, in fact, two teaching styles in TALO one is concerned with the monologue by the teacher explaining with the students taking notes, and the other is a

dialogue in which the teacher asks the questions, the students reply, and the teacher assesses and comments on their answers. In contrast, TAVI method aims at making students do more work on the text in groups as it creates a real communication in the classroom and it represents a model for student's self-study outside the classroom.

2.6.3.5. Follow-up Activities to the Reading of the Text

In the TALO method, the follow-up activities range from comprehension questions to lexical exercises. However, in TAVI method the follow-up activities are grouped into the following four; transfer of information, the explication of information, the extension of information, the application of techniques.

2.7. Reading Comprehension Levels

Generally speaking, educators agreed that comprehension must be the central focus of teaching reading in FL. Reading comprehension is, in fact, the reading product which refers to the result of the reading process and the outcome of what is read i.e. the understanding of the text. Snow (2002) describes comprehension as "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (p.11). In other words, to achieve this product, interrelated sources of information are joined together as the prior knowledge of the reader, the facts presented in the text, and the context of the reading situation.

According to Alderson (2000), this product of the reading process can be measured at different levels which represent the students' level of understanding. Through the interaction 'reader-text', the writer is addressing the reader through his text. However, sometimes the meaning is not offered directly, this is why many readers end their reading of the same text by different understandings. As Grellet (1981) said

“understanding a written text means extracting the required information from it as efficiently as possible”(p.3). As a result, the information that readers infer from a text differ from general to detailed ideas according to the degree of understanding.

Concerning levels of text comprehension, Gray’s (1960) distinguished between three observed levels: *1*.reading ‘the lines’, *2*.reading ‘between the lines’, and *3*.reading ‘beyond the lines’. The first refers to the literal meaning of reading and understanding; i.e. to recognise the clues of the syntactic and lexical written language by decoding the words in order to construct the author's basic message. The understanding of the text's meaning based on the contextual and pragmatic factors is included within reading "between the lines", i.e. understanding the author's implied message. Reading "beyond the lines" is personal as readers approach a text critically in different ways according to their understanding of the communicative intended meaning of the writer. In this level, readers analyse or synthesise information and apply it to other information. Giving his standpoints, Westwood (2001) referred to these levels of understanding as: literal level, inferential level, critical level.

2.7.1. The Literal Level

The literal level refers to the literal comprehension of words and sentences, what is directly stated. It involves decoding the meanings of individual words through the interpretation of letters and context. At the literal level all what is textually explicit is understood including basic facts. In other words, the concept of literal comprehension is reading the lines *per se*. Literal comprehension starts and ends at the word level and does not deal with the readers interpretations of “why” and “how” (Alderson, 2000). Achieving this level of comprehending requires the conventional meanings of lexical and syntactic forms. In simpler words, literal comprehension generally answers the

question “What does this say?” including surface understanding only of facts and details. To elicit this level of understanding questions should be explicitly stated. Generally speaking, objective questions are asked such as true / false, multiple choice and fill-in-the blank (cloze procedure) questions.

2.7.2. The Inferential or Interpretive Level

At this level of comprehension, meaning is concerned with the interpretation of implied meaning but not explicit. For the inferential level, the reader is able to go beyond what is written on the page and adds meaning or draws conclusions. Actually, this level of comprehension involves the generation of thoughts from the printed symbols; i.e., the reconstruction of the author’s message that is encoded in language involves more than understanding as it includes applying what is read, evaluating it, and comparing it with what is already known.

In this respect, Sadoski, (2004) distinguishes between two types of inferences logical inferences that include rules of formal logic (text-based) and pragmatic inferences (situation- based). The former offers a high degree of certainty that with the latter which offers a lower one. Text-based inferencing is understanding language in its contextual function. Thus, each word and every sentence as such has one meaning at the linguistic level, but possibly two functions in two different contexts. For example, ‘A’ is taller than ‘B’, and ‘B’ is taller than ‘C’, then ‘A’ is taller than ‘C’. In contrast, pragmatic inferencing is based on readers’ knowledge of the world that contributes in building meaning.

2.7.3. The Critical Level

In fact, reading does not mean understanding what they say but it extends the comprehension beyond the literal meaning of the text. To state it differently, readers need to think critically about the message they read and realise what the author is trying to say using their personal understanding of the communicative intent of the author of the text. Adding to this, readers may react to a text along the lines including evaluative judgments on the content or style of the text.

Alderson (2000) provides a hierarchical grading for these levels of understanding in terms of difficulty and value and in terms of acquisition. The literal level is placed first and is regarded 'lower' and less difficult to reach than critical understanding which is ranked third. For the inferential level is placed second because to infer meanings is possible only if readers are able to understand texts literally then they can approach texts critically.

2.8. Reading Comprehension Difficulties

Reading difficulties in a FL are a result of a myriad of factors. These problems can be classified into language problems or skills problems (Aebersold & Field, 1997). With language problems, according to Nuttal (1996), many aspects make a text difficult: the unfamiliarity with the language, complexity of concepts expressed and vocabulary words, and limited previous knowledge that readers bring to the text. Indeed, inadequate knowledge of vocabulary and of sentence structure are regarded as the main problems then the background knowledge about the topic.

In terms of vocabulary, vocabulary appears as a significant reason for poor reading that obstructs students' reading and paralyses their language learning ability. Coming across some new words in every sentence creates a constant barrier for students

and leads to lose the eagerness and interest to understand the meaning. To Cohen et al., (1979), complex noun phrases, nominalizations, coordinating conjunctions, participial phrases, and prepositional phrases are the main causes of problems in reading comprehension of the students, especially science learners, because they render texts complex and difficult to understand. In this vein, Gunning (2002) asserts that the vocabulary problems are summarised in the following points:*1).* the lack of basic decoding skills, *2).* the lack of academic vocabulary, 3). limited background, *4).* failure to read for meaning, *5).*the lack of strategies or failure to use strategies, and *6).* limited language skills.

Decoding is an important component skill in effective reading. Automacity in word recognition reduces problems with meaning and comprehension (Cain, 2010), successful reading demands an accurate construction of word meaning either directly from its written form or indirectly by transforming letter string to spoken representation by means of word recognition skill. In addition having a rich repertoire of academic vocabulary is fundamental in achieving comprehension in academic fields. Within this respect, words having multiple meanings are difficult to understand, and for this reason, the readers need to read and think carefully to find a close meaning or other possible meanings. Therefore, words with several meanings could interfere with the students' reading comprehension (Nuttall, 1996). Problems in vocabulary are believed to be due to their poor background knowledge in the subject area (Mustafa, 1998). A reader uses background knowledge to integrate new information from a text into his prior information and vice versa. Within this line of thought, cultural differences appear to have a significant influence on reading comprehension.

In short, the lack of vocabulary knowledge remains the most acknowledged cause that obstructs reading success. For that, having a sufficient vocabulary repertoire is an

important requirement for successful reading comprehension. In fact, knowledge of vocabulary is not sufficient unless it is accompanied with an adequate linguistic knowledge (Day & Bamford, 1998).

Contrariwise, sentence structure, text organisation, and text type affect reading (Aebersold & Field, 1997). Inadequate and limited knowledge of grammar (sentence structure) is another significant cause of comprehension. Many students fail in interpreting the meaning of sentences because they have problems with syntax. Complex sentences poses challenges for learners even if they are familiar with the meaning the words. Besides, Grabe and Stoller (2001) believe that readers have many difficulties particularly in recognising the ways in which texts are organised and information is presented leading to possible comprehension problems. Further, Cohen et al. (1979) endorse that difficulties are due to the lack of awareness of the function of rhetorical devices; students may understand the cohesive link that exists between sentences, yet they fail to spot their function as hypothesis, for instance.

EFL students are mainly confronted with language problems mainly vocabulary and grammar. Linguistic knowledge in the foreign language is an important prerequisite in reading success of students (Hudson, 2007; Hedgcock & Ferris, 2009; Nation, 2009; Lems, Miller & Soro, 2010; Bernhardt, 2011).

Both language proficiency and language skills and strategies are the central components of the reading difficulties in the FL. For EST learners, difficulties are due to the language because reading processing science in the same in all languages text difficulty has considered the contribution of both structure and vocabulary.

2.9. Techniques of Assessing Reading

It is agreed that using only one method in measuring reading comprehension is inadequate and insufficient. For a satisfactory assessment, teachers should combine more than one technique of testing. In this respect, Alderson (2000) states that objective methods can be supplemented by more subjective evaluation techniques for good assessment. Below are the main techniques of assessing reading in literature.

2.9.1. Multiple-choice Questions

Multiple-choice (MC) method is the dominant testing technique used in testing reading; mainly because of its simplicity and precision in preparing, handling, and correcting. MCQ is a test that supplies students with different items to select from. Alderson (2000) emphasises the importance of offering close alternatives in order to push students to choose after attentive processing. MCQ measures basic comprehension of, generally, short passages where the meaning is spread fairly evenly. In multiple choice test, students must select the correct answer from a number of possible answers. MC questions are usually used to test a student's ability to recall information, to interpret data or diagrams and to analyse and evaluate material.

This type of questions is widely used in testing for their numerous advantages, to name some: it enables test-developers to test different aspects in a short time without including the student's ability to write in assessment. Furthermore, the answers are alike which result in a reliable marking and an easiness in coding in computers. Add to this, they can be used for quick revision at the start or end of a class. On the other side, the only shortcoming that is concerned with MQC is its difficulty in preparing and time consumption.

2.9.2. Cloze Procedure

The cloze procedure refers to a completion measure which aims at testing general language proficiency and reading. In this test, students are asked to fill in blanks required through restoring the words that have been deleted using cues from the text and their background knowledge (Cohen, 1994). The deletion rate is mechanically set, usually between every 5th and 12th word leaving few at the beginning and the end.

In fact, the cloze test is easy to construct as it gives the test developers the freedom in choosing the text and in managing the starting point and deletion rate. Actually, the deletion rate does not affect the results very much which make it a highly valid and reliable test. Despite these advantages, cloze test shows a weakness in predicting what this test really measures as it is dependent on the words deleted which, in fact, the test-developer has no control over as they are related to the deletion rate. In other words, test-constructers cannot decide on particular words to be deleted as they are bound with the rate of deletion which results in a sort of variety in the words deleted. This raise a question of validity as a device for testing global comprehension of the immediate local environment as students can fill the blanks without reading and /or fully understanding the text.

Recently, there have been an increase in the number of different techniques for testing reading, we now see a range of different "objective" techniques and also an increase in "non-objective" methods, like short-answer questions, or even the use of summaries which have to be subjectively evaluated (Alderson, 2000). The view is now accepted that measuring the understanding of text by only one method is inadequate, and that objective methods can be supplemented by more subjective evaluation technique. It is likely to employ in a single reading test a number of different techniques, possibly on the same text.

2.9.3. Information-transfer Technique

Another common technique of testing is information-transfer technique. This type of technique measures students' ability to transfer and translate information from the text into non-verbal form by labelling a diagram, completing a chart or ordering a sequence of events. To precise, students are required to write brief answers, relying on the text and their understanding of it, in the spaces provided. Weir (1993) believes that this is an advantage, simply because students are asked to produce as minimum as possible as answers.

Similar to the other testing techniques mentioned above, information-transfer technique proves to have drawbacks in texts where there is verbal and graphic information combination. These information play a complementary role in building the reader's full understanding of the text. For that, many test-developers attempt to break the text into verbal and graphic ignoring their tide relationship which results in making the tasks more demanding and complicated to readers (Alderson, 2000).

Conclusion

This chapter presented the different approaches in teaching reading in a FL including the approaches in designing reading courses, the methods of teaching, and the different tasks and activities, and assessment techniques. The first part of this chapter highlighted the extensive and intensive approaches used in teaching reading in FL spotting light on the advantages and disadvantages of each. In addition, it briefly introduced the four approaches that exist in literature in designing the reading courses to meet the learners' needs. Furthermore, classroom procedure of the different stages of

activities used in teaching were introduced with explanation and examples. Most importantly, what was also reviewed are the differences in English reading problems among the science students and the arts students concerning sentence structure, vocabulary, and reading comprehension. Finally, a short discussion is offered on reading assessment including the most common type of questions to put for knowing how much learners have/ have not understand and thus understand their reading problems.

Chapter Three

General English / English for Science and Technology: A Dilemma in Teaching English

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General English / English for Science and Technology: A Dilemma in Teaching English

Introduction

Generally speaking, English is the main medium of communication In the context of University of Constantine 1, English is integrated in all the science and technology departments as a compulsory module. However, the absence of a determined ESP syllabus in these departments creates a hurdle for teachers to teach English for science and technology students.

In this chapter, we try to explore such an issue by pointing out at the different aspects of English teaching, namely the teaching of GE (General English and EST (English for Science and Technology) and the nature of their discourses. As a second step, we present a comparison between these two branches of the ELT tree, the teachers' role and the students' role. Moreover, we try to discuss the reading skill and its relation with the teaching of EST. Finally, this chapter provides a discussion on technical and non-technical vocabulary together with the rhetorical functions.

3.1. GE, ESP, and EST: An Overview

A careful examination of the ELT tree suggested by Hutchinson and Waters (1987) reveals that General English (GE) and English for Specific Purposes (ESP) are the two main branches of teaching English as FL. In recent decades, there has been a considerable recent debate about what ESP means despite the fact that it is an approach which has been widely used and many questions were raised about the similarities and

differences between these two branches of teaching. In this section, a brief discussion is offered to these main branches with an emphasis on the common points.

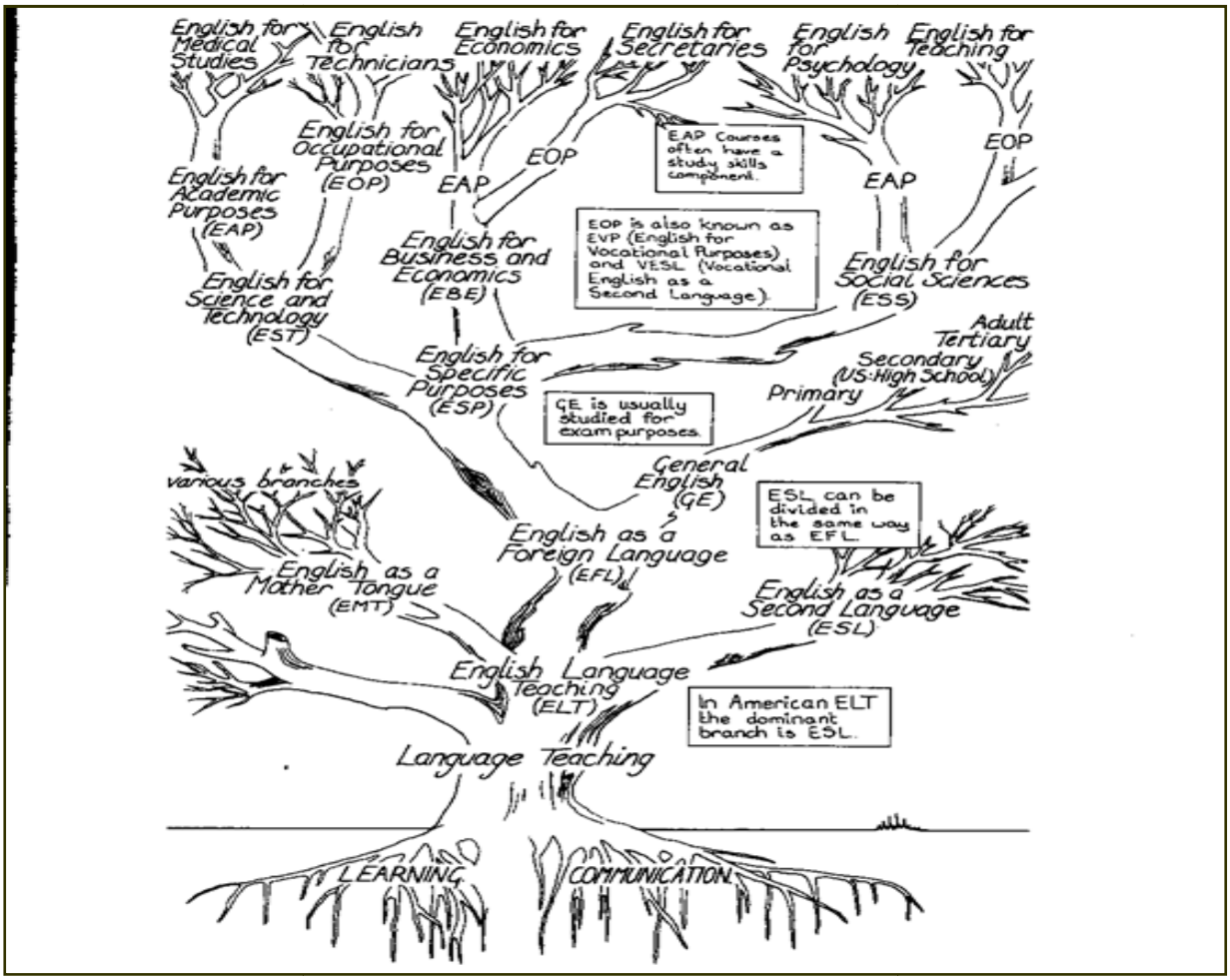

Figure 7. The tree of ELT (Hutchison & Waters, 1987, p.17).

3.1.1.General English Defined

The term General English refers to the type of English courses intended for beginners "aiming to proceed towards a general and fairly high proficiency in the language" (Wilkins, 1976, p.58). In such contexts, teaching English covers the teaching of the fundamentals of grammar, phonetics, oral expression and written expression without specified needs as "the main stay of all the fields whatever the purpose for which the language is used" (Trimble, 1985, p.6). It focuses on the language in general,

and aims at giving the learners a course that may satisfy their urge to know and understand English which enables students to communicate in general situations.

GE covers a large domain where it is the language teacher who determines what to teach, where to begin and from what level. In designing GE courses, different factors should be accounted for, namely, age, purpose, motivation, previous English knowledge, aptitude, and attitude of the learners (McDonough, 1984). In fact, it has an important role in the future performance, especially for learners who want to continue the course towards their field of speciality where English is used.

3.1.2. ESP-EST Defined

Within the broader framework of ELT (English Language Teaching), ESP appears as the branch that questions the learners' needs that are required for their success in education and in career. To meet these needs, ESP is introduced and integrated in the curriculum of almost all the science institutions. In fact, ESP is an approach to language teaching that aims at meeting the learners' needs by designing suitable courses for these learners.

To Hutchinson and Waters (1987) ESP is "an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning" (p. 19). Dudley-Evans and St John (1998) define ESP in terms of absolute characteristics and variable characteristics with some modifications on the original definition by Strevens (1988). Below, we made a short comparison between both definitions suggested:

Strevens's Definition

1. Absolute characteristics:
ESP consists of English language teaching which is:
- designed to meet specified needs of the learner;
- related in content (i.e. in its themes and topics) to particular disciplines, occupations and activities;

- centred on the language appropriate to those activities in syntax, lexis, discourse, semantics, etc., and analysis of this discourse;
- in contrast with General English.
2. Variable characteristics:
ESP may be, but is not necessarily:
- restricted as to the language skills to be learned

Dudley-Evans and St John's Definition

1. Absolute Characteristics
- ESP is defined to meet specific needs of the learner;
- ESP makes use of the underlying methodology and activities of the discipline it serves;
- ESP is centred on the language (grammar, lexis, register), skills, discourse and genres appropriate to these activities.

2. Variable Characteristics
- ESP may be related to or designed for specific disciplines;
- ESP may use, in specific teaching situations, a different methodology from that of General English;
- ESP is likely to be designed for adult learners, either at a tertiary level institution or in a professional work situation. It could, however, be for learners at secondary school level;
- ESP is generally designed for intermediate or advanced students;
- Most ESP courses assume some basic knowledge of the language system, but it can be used with beginners (1998, pp. 4-5).

The major changes that Dudley-Evans and St. John have brought to Strevens's definition are removing the absolute characteristic that ESP is in contrast with General English and adding more variable characteristics. In addition, they state that ESP is not necessarily related to a specific discipline and it can be used with adult learners and with young adults in a secondary school setting. In short, the new version helped in identifying and determining what ESP is and what is not. Within this line, Johns (2013) states that EST "refers to the teaching and learning of English as a second or foreign language where the goal of the learners is to use English in a particular domain" (p.2).

For that matter, ESP is subdivided into ESS (English for Social Sciences); EBE (English for Business and Economics), and EST (English for Science and Technology). Every branch is further divided into two main branches English for EAP (Academic

Purposes) and EOP (English for Occupational Purposes) (Robinson, 1991). However, Hutchinson and Waters (1987) claim that there is no clear-cut between these two ESP and EST.

In the last decades, EST was a synonym for ESP. Kennedy and Bolitho (1984) see that the need of scientists and technologists to learn English for a number of purposes connected with their specialty and the increased demand for exploring ESP. As a matter of fact, ESP researchers (Trimble 1985; Robinson, 1991) gave more importance to science and technology because of the rapid expansion of science and technology. In this respect, Swales (1988) states that "English for Science and Technology has set and continues to set the trend in theoretical discussion, in ways of analyzing language, and in the variety of actual teaching materials" (xiv). EST refers to the English courses for the students of science and technology. Apart from this, Dudley- Evans and St. John (1988) state that "English for specific purposes, and consequently (EST) which is a branch of the former, is centred on the language appropriate to the activities of the discipline it serves in terms of grammar, lexis, register, study skills, discourse and genre" (p.297). For a long time ESP was taken for granted that it is the English devoted to the scientific purposes. The development of ESP is always seen as a part from EST growth.

Widdowson (1979) defines EST as "not as a separate operation but as a development from an alternative realization of what has already been learnt, that is to say, of existing knowledge" (p.45). Moreover, the new trend of English for the fields of science and technology serves up EST learners with the aspects of grammar, lexis, and discourse that mainly characterise the language of science.

3.1.3. Similarities and Differences between GE and EST

The starting point for our discussion is what Hutchinson and Waters (1987) said about the existence of differences and similarities between EGP & ESP/EST "in theory nothing, in practice a great deal" (p.53). Apart from that, these two main branches share a lot of common points in the theory of teaching at the same time they have many different points when it comes to practising each. Earlier on, McDonough (1984) concluded that ESP is not totally different from the other areas of teaching, and that the line between ESP and GE is unclear.

The simplest obvious distinction between ESP and GE lies in the learners' purpose of learning. The majority of ESP students are adults; whereas, the GE students can be children or adults. Thus, it is assumed that the ESP courses build up on what students learnt in the earlier GE courses. Another fact that makes GE different from ESP is needs analysis. ESP, as Robison (1991) stated, is normally goal directed; i.e. ESP courses are based on the specific needs of the learners. However, GE courses are not based on such specific needs. In fact, this is not true for one can always specify the needs. As an illustration, to pass an exam can be considered as a specific need within the general course. In the light of this, Hutchinson and Waters (1987) claim that "what distinguishes ESP from GE is not the existence of the need as such but rather an awareness of the need"(p.53). For that reason, it is very important to discover the learners' true behaviour vis-à-vis the language in both GE and ESP courses, and [more particularly] how these courses are being given. In effect, GE and ESP differ in the nature of the learners and in the scope of goals instruction (Steinhausen, 1993).

As far as the teaching methodology is concerned in GE and ESP, Dudley-Evans and St. John (1998) claim "the methodology is likely to be different" (p.8). ESP makes use of an underlying methodology and activities of the discipline it serves. Both the

methodology and the activities, used in the EST classroom are different from that of the GE courses. EST also differs from GE in that it is centred on the language that is appropriate to these activities especially with respect to grammar, lexis, register, study skills, discourse and genre, all which are different when compared to GE. Wright (1992), though, believes that "methodology is also of crucial importance" (p.5). Indeed, as Dudley-Evans and St. John (1998) has pointed out, ESP courses aim to develop linguistic skills relating to particular spheres of activity, not only the nature of the linguistic items introduced, but the ways in which they are introduced and how they are practised, are highly significant. In teaching, the GE teacher focuses on all the skills, but the ESP practitioner focuses only on the main needed skills say, reading, as we will see further down in the subsequent sections.

3.1.3.1. GE Teacher vs. EST Teacher

In many ways, GE and EST teachers have much in contrast, especially the two points discussed by Hutchinson and Waters (1987). First, what distinguishes both teachers is the role of each one in the classroom. In general, the GE teacher is provided with a syllabus and a teacher's guide which he is expected to abide by; whereas the EST teacher is the material provider himself. The GE teacher performs his task of explaining, and asking and answering questions; on the other hand, the EST teacher is expected to perform all these main functions of the GE teacher besides to other roles, including a course designer, a researcher, and an evaluator. For that, Swales (1988) prefers the term "practitioners" to refer to the EST teacher. The term practitioner covers a wide range of teaching activities, namely material production, course designing, examining what constitutes the students domain of speciality, and thinking of the learner's needs and goals of learning (Needs and Needs Analysis). The EST practitioner is thus responsible

for setting the objectives for his learners and for designing the suitable courses to achieve the students' needs. This would certainly involve the selection of published materials and their adaptation in most of the cases; whereas the GE teacher's role is to make sure to achieve the goals put by the ministry. In contrast with the GE teacher, it is rarely for the EST practitioner to find a textbook that goes with the entire teaching situation [students' needs, students' level, the time of the session, the objectives, the subject content, and the type of the tasks required]. For that matter, 'researcher' is another role of the EST teacher. The EST practitioner as a researcher has to conduct a 'needs and needs analysis and genre analysis to find out the satisfactory materials for teaching. During the courses, the EST practitioner is actually involved in evaluating and testing more than the GE teacher for the purpose of testing the materials used in his teaching experience and the progression of students' level. For both types of teachers, students' collaboration is required; yet, for the EST practitioner it is essential particularly in having some knowledge about the specific subject content.

Second, the EST teacher differs from the GE teacher in his way of teaching. The EST teacher is expected to make teaching more specific to the subject. Unlike the GE teacher, the EST practitioner may face problems with the subject knowledge for he is not the primary knower of the subject; therefore, his role is limited to generating communication in class (Dudley-Evans and St. John, 1998). In this respect, Hutchinson and Waters (1987) put that the EST teacher is not required to learn the specific subject matter because he is not a teacher of the subject matter, nevertheless he should have the ability to ask the specialists about the topic he is teaching and become an interested 'student' in the subject matter. Likewise, the EST teacher is expected to be trained to cope with his students unlike the GE teacher who needs no training.

As a matter of a fact, not all the roles, mentioned above, are performed by the EST teachers in the Electronics Department. The roles of the EST practitioner as researcher and evaluator are completely ignored by both the administration and teachers. Testing the materials used is rarely to occur and this can be explained by the teachers' lack of training, lack of experience and the lack of time on the timetable. In Algeria, EST teachers have no official training unless they have a Master-One or doctorate degree in ESP or they have a degree of one of the higher institutes that train EFL teachers.

3.1.3.2. GE within the EST Discourse

EST discourse covers the area of all what is written for scientists and for technicians. In other words, 'scientific English' is simply English used by scientists or for the purposes of those engaged in science (Strevens, 1976). Following this definition, scientific English has the same grammar, pronunciation and spelling as all other types of English including General English. However, while it may be true that EST discourse has different characteristics in organising the text, it is a mistake to assume that EST discourse is completely different from the other types of discourse (Trimble, 1985). Indeed, technical writing shares features with other types of composition. Register analysis in terms of lexical and grammatical features has revealed that there is little distinguished difference in grammar of scientific English, added that all the items of scientific discourse exist in English. To Hutchinson and Waters (1987), "register analysis did not, for example, reveal any forms that were not found in GE" (p.10), but that these forms differ in their frequency of use in both GE and EST and all the registers of English, they share a 'common core'(Malcolm, 1987) but that they differ in the occurrence of the language items and that "the same formula used for general English accounts for tense choices in EST" (Quoted in Robinson, 1991, p.25).

At any rate, register analysis has shown that while the grammar of scientific and technical writing does not differ from that of General English, certain grammatical and lexical forms are used much more frequently. It is noticed that EST content-related specific language cannot stand alone without General English syntax, lexis and functions. For example, linguistic structures such as modals that indicate degree of certainty as ‘may’, ‘might’, as well as nominalization of verbal nouns through suffixes such ‘are’ relatively more important in EST than in GE (Dudley-Evans and St. John, 1998).

To sum up, we can say that GE and ESP should be regarded as one entity rather than two parts of TEFL programmes. We can, then, advance the thought that General English language content, grammatical functions and acquisition skills are evenly dominant in ESP curriculum development and course design.

3.1.3.3. GE and EST Courses

Actually, the term ESP is generally used to refer to the teaching of English for a clear utilitarian purpose. Therefore, ESP courses are solidly based upon achieving these purposes by enabling students to read, write, and speak fluently in their specialised subjects. The concept of needs analysis is, then, placed at the heart of ESP course design, programmes implementation and evaluation (Hutchinson & Waters, 1987; Dudley-Evans & St. John, 1998).

To best describe the ESP course, Smöak (2001) emphasises four important aspects as regards ESP: (i) ESP is not teaching lists of technical vocabulary; (ii) assumptions and intuition about language use in ESP situations are probably inaccurate, (iii) needs analysis should include observation of the language use in context; (iv) materials should be appropriate and authentic.

Special lexical, semantic and syntactic characteristics of technical language, in addition to its communicative function enable people in a particular academic, professional or vocational field to convey the meaning more specifically. Precision in language is therefore a unique concept in specific purpose language teaching and testing (Tratnik, 2008). On the other hand, GE courses are characterised by their focus on education, their difficulty in content selection, and the importance for the content in the syllabus to have a high surrender value.

On the other hand, the sub-technical vocabulary lies between General English and technical vocabulary of a particular specialism and it is of great importance to ESP learners, as it is precisely this language that they need to communicate about their speciality. Nonetheless, it remains debatable where actually ESP courses end and General English courses begin.

3.2.Needs Analysis: A Target Situation Model

Looking through the literature, a variety of definitions and terms of needs analysis are provided by different scholars and all of them consider it as a vital aspect in designing and developing language courses particularly in English for Specific Purposes (ESP). In this respect, Robinson (1991, p.7) states "needs analysis is generally regarded as critical to ESP, although ESP is by no means the only educational enterprise which makes use of it". Earlier on, Hutchinson and Waters (1987) argue that "any language course should be based on needs analysis. Along with this line, West (1994) states that in the ESP/EAP context it is imperative to carry out a needs analysis to determine the learners' specific needs. Needs analysis is a vital aspect in designing and developing language courses through identifying what the learners already know, what they need to know, and, finally, what they want to know.

Target Situation Analysis (TSA) is a form of needs analysis which focuses on students' needs rather at the end of a language course (Robisnson, 1991). In simpler words, TSA involves the "identification of tasks, activities and skills learners are/will be using English for; what the learners should ideally know and be able to do." (Basturkmen, 2010, p.19). It was first introduced in a comprehensive framework by Munby (1978) placing the learners' purposes in the centre. As a matter of fact, Mumby's Communicative Needs Processor (CNP) was the best-known model where all variables that affect communication needs are organised as parameters in a dynamic relationship. Later on, all the subsequent models (Chambers, 1980; Robinson, 1991; Hutchinson & Waters, 1987) were based on the outcome of Munby's model: what the learner needs to know in order to function effectively in the target situation? Simply, target situation analysis is "a matter of asking questions about the target situation and the attitudes towards that situation of various participants in the learning process" (Hutchinson & Waters, 1987 p. 59). Accordingly, Dudley-Evans and St. John (1998) argued that asking the right questions is more important than the corresponding answers.

3.3.ESP-EST and Reading

Reading is at the heart of much of what ESP students do both in acquiring knowledge of target community discourse and in conjunction with the use of another skill, such as writing. As a matter of fact, McDonough (1984) posits that it will "come as no surprise to most people to discover that, in ESP terms, by far the most significant skill is that of reading."

Hirvala (2013) states that reading's ascendancy in ESP coincides with important shifts in ESP itself; i.e, with every new stage in ESP there was a new approach to

reading. To know where reading has come from as related to ESP, we need to trace the development of reading within the history of ESP development in each area. In this respect, Hutchinson and Waters (1987) have explained that teaching reading received minimal attention in the early stages of ESP development, namely, at the stage where the study and analysis had been based on the surface forms of the language. However, things have changed with the shift of emphasis from the sentence level to the above level, involving the discourse (rhetorical analysis), where reading pedagogy in ESP took major steps forward.

In fact, reading was encouraged particularly after the emergence of ESP textbooks that advocate long reading passages as Allen and Widdowson's (1974) *English in Focus,* or Swales' (1985) *Episodes in ESP* In such textbooks, the emphasis was given to explain the role of discoursal elements in understanding texts. These textbooks highlighted the importance of showing students how to identify and make use of these priming devices (discoursal elements) became a central focus of ESP reading instruction.

Reading instruction has also witnessed a major change through the important work of Trimble (1985) in the field of EST which emphasised the idea of discourse analysis adopting a rhetorical approach to teaching non- native speakers how to read scientific and technical English. In addition, it has brought new insights to the reading -writing relationship considering reading a transfer technique. This transfer process is best improved through the "visual-verbal relationships are a very useful tool to exploit when teaching reading or when transferring the teaching emphasis to writing" (Trimble, 1985, p.160). Accordingly, there was an increasing focus on relating teaching reading to specific rhetorical and communicative contexts rather than teaching core reading comprehension skills that can be used in different reading situations. Within this line of

thought, Dudley-Evans and St John (1998) stressed the idea that ESP readers need to learn how to identify and extract relevant information from the text as a vehicle rather than looking at the text as a linguistic entity (see TALO & TAVI in the preceeding chapter).

Taking into account all what is mentioned above, Bruce (2011) explained how reading should be taught within two primary frameworks: as a stand- alone skill or as an integrated approach.

> Reading is sometimes taught on its own as a separate skill, sometimes in conjunction with writing, and sometimes as a component of a study skills programme. Whether a single skill or an integrated approach is taken, the main focus of reading instruction often tends to be the development of sub - skills related to extracting different types of information from texts, such as skimming for gist and scanning for specific details (p.140).

Reading is often taught as a skill in its own right aiming at improving comprehension. Within this framework, teachers generally focus on building students' knowledge of valuable reading strategies including general purposes and specific purposes reading skills with a focus on the rhetorical features of target community texts. Simply, teachers need to emphasise the core of reading skills and discourse analytic skills. In special fields like EST, a central attention is devoted to focus on locating the relevant or desired information which is seen as the most necessary skill (Moore, 1983). At this level, teachers need to teach and equip students with flexible reading strategies as well as metacognitive strategies, including those applicable to specific types of discourse in the different disciplines.

Another approach in teaching reading in ESP is an integrated skills approach with reading seen as a stepping stone to other skills. This approach gives more importance to the connections between reading and the other skills like speaking and writing. There are important works in this context particularly based on genre analysis (Hirvalla,

2013). The focus is on the various reading strategies and comprehension practise, the resultant exercises usually involve writing.

Quite simply, reading serves writing, the process starts when readers are exposed to texts exemplifying the genres and analysing their features to understand and to gain input to use it in reproducing the same genres as they developed an awareness of the components of the genre needed for writing.

It is of crucial importance to make students have a good command of target community scientific discourse, this is the role of the ESP teacher who is expected to be equipped with sufficient knowledge of the various disciplines students seek to join. In this regard, Mustafa (1995) has provided detailed descriptions of how this kind of arrangement can equip ESP teachers to design appropriate courses in which students experience meaningful reading and analysis of relevant genres and begin learning how to write them. In these courses, reading is the starting point for students ' understanding of genres and serves as the foundation from which they draw the linguistic and rhetorical information they need to produce genres as they transfer that information from reading to writing.

3.3.1. Vocabulary in ESP-EST

Lexis is one of the most important elements to be considered when discussing English language in general and in ESP in particular. Practically speaking, vocabulary in ESP is important for a very simple reason; learners need to know the language of their field, including vocabulary items -which represent a significant part of language- to succeed in their reading and writing activities and passively to communicate effectively in their communities if even the need rises. In addition, it can constitute an important barrier in front of effective language acquisition**.**

Vocabulary in ESP is referred to in the related literature by very different names: specialised, technical, sub-technical, semi-technical, and non-technical vocabulary. Basically, these terms usually refer to the vocabulary of a particular area of study or professional use (Coxhead, 2013). In this section, a brief presentation of different classification of vocabulary in ESP is offered.

- Trimble (1985) divided vocabulary into two categories : Technical (words with particular sense dictated by the subject matter); sub-technical (high frequency words that occur across various disciplines and words that co-occur with special meaning in specific fields).
- Baker (1988) distinguishes three types of vocabulary: 'General lexis' (identified on the basis of its even distribution across medical and general English); 'Specialised lexis' (identified on the basis of (a) its uneven distribution among medical texts, ie text specificity and/ or (b) a significant difference between its frequency of occurrence in medical and in general English); 'Items not identified as specialised or general' (are assumed to have a potentially significant role in structuring the writer's argument).
- According to Jordan (1997) vocabulary is grouped into three categories: 'core vocabulary' (neutral words that do not indicate degrees of intensity or formality and words that will only be expressive of a particular field); 'academic vocabulary' (Words that occur across a number of disciplines); 'technical vocabulary' (Words that are closely connected with learning the subject matter).
- Dudley- Evans and John (1998) technical vocabulary: (general service words that have specific meanings in certain disciplines). Those having higher frequency in a specific field.
- Nation (2001) identifies four levels of vocabulary according to their use in writing: 'High-frequency words' (refer to the most frequently used 2000 words of

English that were used in all types of writing); ‘low-frequency words’ (are the rarely used terms and covered only 5% of all words); ‘academic word’ (namely semi-technical or sub-technical vocabulary, were for academic purposes. This vocabulary is common to a wide range of academic fields but is not what is known as high frequency vocabulary and is not technical in that it is not typically associated with just one field); ‘technical words’ (are the ones used in a specialised field, which are considerably different from subject to subject).

- Fraser (2006) suggests four categories of vocabulary: ‘Fully technical vocabulary’ (consists of words with meanings which are clearly technical: they are specific to the field and not likely to be known in general language); ‘crypotechnical vocabulary’ consists of polysemous words such as transmitter, dependence, and relaxation: these words could be said to be “cryptic” in that they have a technical meaning which may be obscure to a non-specialist), ‘lay-technical words’ (are those terms which are obviously technical, but whose basic meaning would, nevertheless, be understood by someone without specialist knowledge in the field); ‘academic vocabulary’ contains a large number of discourse-structuring words and words with an analytic or evaluative or evaluative role. It may also involve words from the high frequency categories; for example, verbs involved in analytical description (cause, develop, result in/ from, lead to), or anaphoric nouns such as *problem*, *findings* and *study.*

Above all, our concern is with the technical vocabulary and sub-technical vocabulary regardless of the different labeling offered. These two sub-divisions of vocabulary are presented in detail in the following sections.

3.3.1.1. Technical Vocabulary

Chung and Nation (2004) define this type of vocabulary as "technical vocabulary is subject related, occurs in a specialist domain, and is part of a system of subject knowledge. Each of these features can provide a basis for the deliberate identification of terms"(p.252). Technical or specialised vocabulary refers to the highly specialised words usually used only by specialists and subject teachers (Greavu, 2005). These words are used within a particular subject area as they belong to a specific discipline; and their meanings are closely associated with that subject area. It could thus be identified by referring to specialists who have a good knowledge of the subject area. Basically, people outside that academic or professional sphere might have some knowledge of this vocabulary but the people inside these areas of language use would be expected to be able to understand and use this language fluently.

With respect to the size of the technical vocabulary, Nation (2009) states that " we do not know a lot about technical vocabularies but they probably range in size from around 1,000 words to 5,000 words depending on the subject area" (p.10). In fact, almost all of the fully technical words are of Greco-Latin origins; for example, 'cardiac', 'oedema', and 'ventricular' (Fraser, 2006). Apart from this statement, ESP learners may face an extremely large learning task to fully develop their understanding and use of specialised vocabulary in their subject area at university or in a professional context.

Actually, technical vocabulary is a major concern for learners who have special purposes in language learning. As Chung and Nation (2003) point, technical vocabulary is largely of interest and used by people working in a specialised field. In literature, there are no well-established approaches for deciding which words are technical terms and which are not. In this line, Baker (1988) believes that specialised lexis is identified

on the basis of (a) its uneven distribution among medical texts, ie text specificity and/ or (b) a significant difference between its frequency of occurrence in medical and in general English.

In this respect, Chung and Nation (2004) suggest four different approaches to identifying technical words in scientific texts. The first approach is ***The rating scale;*** researchers have to rely on their intuition and knowledge of the field to decide on the individual meanings of words. The rating would depend on how closely related the meaning of a word is to the particular subject area, and the scale would range from the least related meaning to the most.

Another way of deciding whether a word is a technical term or not is to let a specialist decide by ***Using Dictionary;*** simply one needs to check a word in a technical dictionary for that specialist area to decide if a word is a technical word or not. If the word does appear as a main entry or a sub-entry whether it appears in the same form or can include closely related family members and spelling variants, and whether a word has to occur alone in the dictionary or can occur as part of a multi-word group, it is a technical word. It is important to decide upon which dictionary to use; for example, the largest dictionary is not necessarily the best as the largest dictionary may include many words that are not technical terms.

Using clues provided in the text is the third approach suggested by Chung and Nation (2004). Three major types of clues can help in identifying technical words in scientific texts: definitions, typographical and labels in diagrams or illustrations. Generally speaking, technical words are explicitly signaled by the writers in the text by providing the word's definition and marking it in bold, in italics, or between brackets. However, it is not an easy task to find such words because definitions can take a variety of forms, typographical signals can have a variety of functions, and not all labels

on diagrams are technical terms and function words like *the*, *of* and *a* can be parts of labels.

The last approach is ***using a computer-based approach:*** Automatic term extraction, automatic term recognition, or computer-assisted term acquisition are different labeling for the computer-based approach in identifying technical words in scientific texts. In fact, this approach is based on term extraction software which uses two different approaches: statistical and linguistic. The statistical approaches basically compare the number of occurrences of a word in a technical corpus with the number of occurrences in a comparison corpus. The linguistic approaches take advantage of linguistic cues such as word form analysis, part of speech, grammatical structure of possible terms such as noun-noun or adjective-noun structures.

A close look at the figure below reveals that the items classified at steps 3and 4 are considered to be technical words and items at steps 1 and 2 are not. To use this scale effectively, one should have a good knowledge of the subject area.

Step 1 Words such as function words that have a meaning that has no particular relationship with the field of anatomy, that is, words independent of the subject matter. Examples are: *the, is, between, it, by, 12, adjacent, amounts, common, commonly, directly, constantly, early,* and *especially.*
Step 2 Words that have a meaning that is minimally related to the field of anatomy in that they describe the positions, movements, or features of the body. Examples are: *superior, part, forms, pairs, structures, surrounds, supports, associated, lodges, protects.*
Step 3 Words that have a meaning that is closely related to the field of anatomy. They refer to parts, structures or functions of the body, such as the regions of the body and systems of the body. Such words are also used in general language. The words may have some restrictions of usage depending on the subject field. Examples are: *chest, trunk, neck, abdomen, ribs, breast, cage, cavity, shoulder, girdle, skin, muscles, wall, heart, lungs, organs, liver, bony, abdominal, breathing.* Words in this category may be technical terms in a specific field like anatomy and yet may occur with the same meaning in other fields and not be technical terms in those fields.
Step 4 Words that have a meaning specific to the field of anatomy and are not likely to be known in general language. They refer to structures and functions of the body. These words have clear restrictions of usage depending on the subject field. Examples are: *thorax, sternum, costal, vertebrae, pectoral, fascia, trachea, mammary, periosteum, hematopoietic, pectoralis, viscera, intervertebral, demifacets, pedicle.*

Figure 8. A rating scale for finding technical words (Chung & Nation, 2004, p.255).

Another important point to make is that research indicated that technical language of science posed a problem of familiarity and only few students can cope well with this (Ali & Ismail, 2006). In case technical words are not familiar for learners, teachers need to offer more importance in teaching as dealing with them before tackling the text where they exist. In other cases, technical term can be a cognate as it exists in the students' first/ or second language which do not create less /any difficulty (Dudley-Evans & St. John, 1998).

In his discussion on the potential difficulties faced by learners in the acquisition of technical vocabulary, Fraser (2006) said that pronounceability, orthography, length, morphology, inflexional and derivational complexity, synformy, and semantic features are the main possible problems that learners can encounter. He explains that problems with pronunciation are caused by the foreign phonemes, phonotactic irregularity, and

variable stress and vowel change. To illustrate, he gave the following examples of the problems encountered the Japanese learners:

1. The "th" in '*therapy'*, '*ethonal'* for example is pronounced with "s" because of the lack of the mporpheme/θ/,
2. The /v/ is mispronounced as /b/ in '*volume'*, '*survival'*, and '*vivo'* (the sound /v/ is rare in Japanese.
3. The letters, "a", "e", "i","o", and "u" are always pronounced /ɑ /, /e/, /i/, /o/ which result in mispronouncing words like '*ion'*, '*domain'*, and '*diabetes'*.

In addition, the morphological complexity of words with multiple inflexional forms can create difficulties for learners; for example, irregular plural (criterion/criteria) (Fraser, 2007). In fact, the difficulty depends on the familiarity of the learner with the constituent morphemes; in particular the affixes (prefixes and suffixes such as '*hype*r', '*patho'*, and '*ilis'*). Being familiar with the meaning of these affixes enables learners to work out the meaning of many technical words. Another source of difficulty is synformy, the words which differ in meaning but sound alike, particularly those which differ according to suffixes ('comprehensive'/ 'comprehensible') and those with identical consonants but different vowels ('adopt'/'adapt').

Furthermore, specificity and multiple meaning are the two main semantic properties that can create problems of understanding for EST learners. Words with high specificity are more difficult as they are restricted to a very narrow area of use; against the words which cover a large area of meaning and fit a variety of contexts. To illustrate the point, Fraser (2006) suggests these examples: 'cardiomyocyte' (a type of muscle cell found only in the heart) or 'toxicosis' (in toxicology, a diseased condition resulting from poisoning). Earlier on, Strevens (1988) claims that, when learners are familiar with scientific field, technical words are easier to learn than general words. However, words

with multiple meanings are of crucial importance particularly when dealing with polysemes or homonyms. In this respect, Fraser (2007) posits that in teaching technical words, teachers need to bear in mind the fact that some learners know one of the meanings of polysemes or homonyms and continue to use it even it does not fit in context.

Basically, teachers cannot teach students all the technical and scientific vocabulary but they hope to teach them the specialised technical vocabulary of their own subject. Inman (1978) said that if teachers focus on technical vocabulary only they would probably need to exclude nearly 80% of the text taught and emphasised that sub-technical vocabulary should be at the core of teaching scientific English. For that, what teachers of English can usually hope to do is to teach a vocabulary which is generally useful to students of science and technology; i.e, words that occur frequently in technical literature of different types.

Chung and Nation (2003) claim that ESP the teacher lacks specialist knowledge of the learners' technical areas. However, teachers can play a useful role in preparing learners for coping with technical vocabulary by helping them gain more general skills of recognising technical words and providing them with tools for dealing with technical words as vocabulary strategies.

In EST courses students often have difficulty not with the technical jargon (which usually has a unique L1 equivalent, familiar to students from their specialised studies), but with the common core of semi-technical words that occur in most disciplines (Alemi & Ebadi, 2010).

3.3.1.2. Sub-technical Vocabulary

In literature, many researchers have offered different labeling to this type of

vocabulary as seen in section (3.3.1.); Sub-technical (Cowan, 1974; Robinson, 1980; Trimble, 1985; Baker,1988), non-technical (Cowan, 1974; Cohen et al., 1988; Nation, 1990; Tao, 1994), semi-technical (Farrell, 1990), academic words (Anne Martin, 1976), core vocabulary (Dudley-Evans & St John, 1998). Not only there is a variance in the names of this category of vocabulary but also differences in the definitions offered. In this respect, Baker (1988) notes that this category of vocabulary is confusing as it has neither been clearly nor consistently defined in the literature. It is important to start with Cowan (1974)'s definition as he is the first to use the term sub-technical:

> The non-technical are words which may:1) take on a technical meaning in a particular field referred to these as sub-technical vocabulary, 2) appear as contextual paraphrases for other words or phrases, 3) from part of specialized non-technical lexis items indicating time sequence, measurement, or truth validity (Cohen et al., 1988).

Trimble (1985) maintains the idea that sub-technical vocabulary consists of words that have one or more general meanings. In technical contexts take on extended specialised technical meanings and grouped them into two categories:

> Words that have the same meaning in several scientific or technical disciplines (words such as *function, isolate, basis, stir, boil, freeze*) that is context-independent words and words that are "common" but take on extended meanings in specific ST texts context -dependent, discipline-based words (p.129).

Later research endorsed the idea that sub-technical vocabulary embraces both context independent and context-dependent words and highlighted new features of discipline-based words: the specialised meanings that these words have in different fields of study are sometimes metaphorical extensions of the general meaning (Li Lan 1989), and such a group of words can be polysemous and homonymous.

In simpler words, sub-technical words are intermediate level words which are neither highly technical nor obviously general (Cohen et al., 1979). In recent research,

non-technical vocabulary refers to "terms that have one or many meanings in everyday language but which have a precise and sometimes different meaning in a scientific context" (Ali & Ismail, 2006,p. 73). Some of them having "a single absolute definition for such words, while others consider that the category has open boundaries which will flexibly allow for any general word that becomes technicalised and also any technical vocabulary item that becomes generalised." (Jaqueline Lam Kam-Mei, 2001).

Sub-technical vocabulary is context- dependent which occur with high frequency across disciplines. Baker (1988) states that general vocabulary is characterised by its high frequency of occurrence. To illustrate, Baker (1988) suggests some types of items which have been referred to as "sub-technical" by various linguists:

1. Items which express notions general to all or several specialised disciplines, eg. factor, method and function.

2. Items which have a specialised meaning in one or more disciplines, in addition to a different meaning in general language 'Bug' in computer science for instance, is different from 'bug' as we know it in everyday use. Solution has different specialised meaning in mathematics and chemistry, in addition to its general language meaning.

3. Items which are not used in general language but which have different meanings in several specialised disciplines. 'Morphological', for instance, means different things to linguists and botanists.

4. Items which are traditionally viewed as general language vocabulary but which have restricted meanings in certain specialised disciplines in botany 'effective' simply means 'take effect'; it carries no evaluative meaning. In the same discipline, 'genes' which are expressed have observable effects; i.e. are more apparent physically as opposed to being masked. 'Expressed' in botany is therefore not associated with emotional or verbal behaviour as is the case of general language.

5. General language items which are used, in preference to other semantically equivalent items, to describe items, to describe or comment on technical processes and functions. For example, a recent examination of a corpus of biology textbook revealed that 'photosynthesis', and other processes such as 'digestion', do not apparently ever 'happen': they overwhelmingly 'take place' and occasionally 'occur'. 'Take place' and 'occur' can therefore be regarded as sub-technical vocabulary.

6. Items which are used in specialised texts to perform specific rhetorical functions. These are items which signal the writer's intentions or his evaluation of the material presented (p.92).

With respect to these six types, Baker (1988) states that type two and three cause little or no difficulty for the learners once they are made aware of the fact that certain items have different meanings from the ones they are or may be familiar with. However, types four and five require a fairly simple explanation from the teacher especially for comprehension rather than production purposes.

Accordingly, commenting on the six categories presented above, Duddley-Evans & St John (1988) suggest that these categories overlap and can be resumed into two broad areas: Technical description and discussion (category 1,5 and 6) and vocabulary that has specialised and restricted meanings in certain disciplines and which may vary in meaning across disciplines (2,3 and 4).

In terms of difficulty, Greavu (2005) states that the major obstacle to the comprehension of technical and scientific texts is not the technical vocabulary nor general vocabulary, but a third intermediate lexical category between the general and the fully technical, constituting the largest proportion of scientific and technological texts and known as sub-technical. In this respect, Cohen et al. (1979) believe that sub-technical words constitute the most important barrier in front of understanding

specialised texts as they create more difficulty than technical ones in some technical writings. Accordingly, they (1997) emphasise three areas of difficulty of the non-technical vocabulary.

The readers' limited knowledge of the different meanings of the non-technical words particularly in technical fields is the first area of difficulty. It creates an obstacle to the students' understanding of sub-technical words; mainly, the students' unawareness of the unfamiliar meanings of the familiar words. Students' preconception of the meaning of words, expecting the general English meaning to make sense in any context, is a source of comprehension difficulties.

The second area of difficulty is concerned with using two (or more) words, or phrases, to refer to the same concept. Specialists in the field believe that problems of lexical cohesion occur not only at the level of synonymy, but across two different levels of specificity. The third area of difficulty that emerged was that of specialised non-technical lexis, for instance, vocabulary items which indicate time sequence or frequency; namely initial, final, perpetual, succeeding, ensuing, preceding, progressively, simultaneously, alternately, consecutively, intermittently. In fact, mainly these words carry much of the meaning of the scientific texts. For that, it is interesting to direct teaching to these categories of non-technical vocabulary.

3.3.2. Rhetorical Functions and EST

To Trimble (1985), rhetorical techniques and functions were placed at the heart of his study of scientific discourse. As a matter of a fact, Trimble (1985) highlights four rhetorical levels which are illustrated in table below:

A. The objectives of the total discourse

Examples: 1. Detailing an experiment
2. Making a recommendation
3. Presenting new hypotheses or theory
4. Presenting other types of EST information

B. The general rhetorical functions that develop the objectives of level (A)

Examples: 1. Stating purpose
2. Reporting past research
3. Stating the problem
4. Presenting information on apparatus used in an experiment-
a) Description
b) Operation
5. Presenting information on experimental procedures

C. The specific rhetorical functions that develop the general rhetorical functions of Level B

Examples: 1. Description: physical, function, and process.
2. Definition
3. Classification
4. Instruction
5. Visual-verbal relation

D. The Rhetorical techniques that provide relationships within and between the rhetorical units of level c.

Examples: I. Orders
1. Time orders
2. Space orders
3. Causality
II. Patterns
1. Causality and result
2. Order of importance
3. Comparison and contrast
4. Analogy
5. Exemplification
6. Illustration

Figure 9. The four levels of rhetorical function (Trimble, 1985, p.11)

The first level (A) is concerned with highlighting the objectives of the total discourse (EST writing) in presenting information; for example, detailing an experiment, making a recommendation, presenting new hypotheses or theory, and presenting other types of EST information. Level (B) consists of the general functions that elaborate the objectives of level (A). For level (C), it is about the specific rhetorical functions commonly used in EST: description, definition, classification, instruction and

visual- verbal relationships. Finally, level (D) constitutes of techniques that relate and explain the relations of and between units of level (C). They are divided into natural orders such as time and space orders, logical patterns like causality and result and order of importance as comparison and contrast.

Accordingly, EST discourse is presented through the rhetorical levels that constitute a coherent framework. In the next section is devoted to discussing the different rhetorical techniques with focus on definition and classification as they represent our main concern in this research.

3.3.2.1. Definition

Defining is best understood as "a series of interlocking systems: dominated by the semantic system, which interacts with the subordinate syntactic, lexical, and typographic systems to produce a broad range of definition formulas "(Darian, 2003, p.47). Ahmad (2009) highlighted two types of definition: simple and complex. Simple definition represents one sentence that can be further divided into three other types; whereas, the complex definition refers to more than one sentence definitions. The complexity of a definition depends on the age, interests, purpose, and background knowledge of the audience. The less expert the audience, the greater your need to define, but the less technical your definition can be (Darian, 2003).

3.3.2.1.1. Simple Definition

Earlier on, Trimble (1985) has further divided the simple definition into formal, semi-formal, and non-formal. They will be sketched out presently.

3.3.2.1.1.1. Formal Definition

It refers to the one sentence definition that offers the reader with three kinds of information:

(1) The theme of the term being defined
(2) The class to which the term belongs
(3) The difference(s) between the term and other members of the class; these differences are essential characteristics of the term.

The above elements represent the three pieces of information that emanate from a single sentence are illustrated by Trimble (1985) in a form of an equation such as, "species= genus + differentia or T= C+D. T is the tem being defined, C is the class and D is the sum of the differences which distinguish it from all other members of the class.

In this respect, Darian (2003) states that the term to be defined (the species, or definiendum) speaks for itself and needs no elaboration, the class word (class, genus, or definiens) is usually at a higher level of abstraction than the term (a man is an *animal* that uses language). This class word may be general or specific [substance (general) and metal (specific)], depending on the nature of term being defined. At the same time the class word should be as narrow as possible so that the limiting features need not include an excessive amount of information. The third element is the limiting features which refer to the items that differentiate the specific term from other members of the class.

The following example serves as a best illustration:

A barometer is an instrument which measures atmospheric pressure.

The term that needs defining: *barometer*

The class to which the item belongs: *instrument*

And the differentiation of the term from the other members of the class: *measures atmospheric pressure.*

In fact, to define a term, one needs to place the information in the order stated

above by identifying the class to which the term belongs, which can be either broad or narrow. For example, a pen can be classified as a “thing” or as a “writing instrument”.

Flowerdew (1992) suggests that formal definitions can be sub-classified according to the semantic content of the characteristic in one or more of the following four semantic categories:

Behaviour/process/function …a way of defining a metal is by saying that it is an element that readily forms a cation

C**omposition/structure**... compounds ... are substances / the molecules of which / are made up from ... two or more different elements / two or more different elements ...

Location/occurrence ... remember /1 said ultra structure is the fine structure within the cell...

Attribute/property... metallic bonding is a non-directional electrostatic attraction / between a lattice of cations / and a surrounding sea of valence electrons ... (p.210).

3.3.2.1.1.2. Semi-formal Definition

It provides readers with less information. It contains two basic defining elements: the term being defined and the statement of differences (Trimble, 1985). Generally, the class is missing because it is assumed to be either obvious or it is so large as to be meaningless, for instance, the class (substance) can be easily dropped from the following example because it is obvious.

An insulator is *a substance which* does not conduct heat or electricity. (An insulator does not conduct heat or electricity).

Similalry, semi-formal definitions can be subclassified according to the semantic content of the characteristic into:

Behaviour/process/function... conduction of water and dissolved substances from the

tip of the root into the stem / and of course plant food coming back from the leaves down into the root / so that is the vascular function...

Composition/structure ... you remember that we said that compounds were made from two or more different elements combined chemically...

location/occurrence... behind the zone of differentiation we have the permanent tissues / this is where the recognisable tissues have finally been established / permanent tissues ...

Attribute/property ... this is a fibrous root system / alright / where you have no one root being more important than the others ... (Flowerdew, 1992, p.211).

3.3.2.1.1.3. Non-formal definition

In such type of definition, the information is simply offered in a word or phrase having the approximate meaning of the term. In some cases, the outstanding characteristic of the term is provided instead. This word or phrase can be stated positively as a synonym or negatively as an antonym (Trimble, 1985). Generally speaking, such definition is based on giving the term then defining it by the most common or most outstanding characteristics, For example:

An arachnid is a spider.

The definition is based on substituting the term “arachnid” with another term “spider” which is in fact more general and known. The writer’s aim, in most of cases, behind using the non-formal definition hat is providing readers with a clear idea of the meaning of arachnid to avoid any kind of loss of comprehension that readers may encounter.

3.3.2.1.2. Comprehensive Definition (Complex Definition)

Respectively, complex definitions refer to more than one sentence definitions, usually expansions of formal definitions (Flowerdew, 1992). According to Ahmad (2009) comprehensive definition includes those special types that are found frequently in writing EST discourse. These are definitions (1) by stipulation (2) by operation and (3) by explication. As a rule all three forms of expanded definition are found in full paragraphs or in group paragraphs.

3.3.2.1.2.1. Stipulatory Definitions

These definitions are found only in connection with other types of definition which are usually, but not necessarily, formal in form. This type of definition aims at setting limit in time, in place, in meaning, in field, in meaning to the main definition. In fact, stipulatory definition is further divided into: mathematical stipulation, legal stipulation and general stipulation (Darian, 1981).

The mathematical stipulation aims to identify the symbols in a formulae or an equation or the set values to variables. However, legal stipulation is found mostly in contracts and similar business documents. Finally, general stipulation is concerned with the new words which result from the developments and discoveries in science and technology. It is mainly allocated for terminologies of the scientific and technological equipments and the new ways to assign the activities, processes or objects resulting from research and similar investigations.

3.3.2.1.2.2. Operational Definitions

They are concerned with providing measurable meanings to abstractions for one particular time and place. Operational definitions are widely used by scientists to create

a test for discriminating a particular abstract word in a particular circumstance. With the help of the operational definitions science readers can learn to know what to do in order to experience physical and mental activities, while acquiring the actual import of whatever is being defined. Most operational definitions in written EST discourse refer to physical and mechanical activities. Often, the text of such a definition contain a set of instructions with verbs usually in the indicative rather than in the imperative form. To illustrate (Ahmad, 2009) provides the example below:

> **The sound (F) is a voiceless labio dental fricative, formed by placing the lower lip tightly against the upper teeth, closing the vellum, and forcing the breath out the spaces between the teeth or between the teeth and the upper lip (Ahmad, 2009, p.48).**

Generally, definitions of this type develop the information in more than one sentence, at least one paragraph. This example represents an operational definition in a single sentence. This is based on the idea that a short definition is easier to remember. For another, longer definitions may contain unessential items.

As we mentioned earlier, all types of definitions are made up of three nuggets of information: the term, the class, and the limiting features. The characteristics of definitions are likely to vary (Flowerdew, 1992). Darion (2003) provides a wealth discussion for the different forms of limiting features, from which we have slected the following :

- ***Relaters:*** A relater is a word or phrase that joins the class word to a specific property of the limiting feature. For example:

"A plane is a tool used for shaving down the edges of wood."

The phrase 'used for' in the above sentence indicates the semantic mode of purpose. The relater dominates the choice of what is to come and thus has a semantic function.

- ***Typographics*** typographic marks serve as vehicles of definitions, including:

1. the equal sign (=): “In formal definitions, T = CW + LF.”

2. colon (:): “Some substances are compounds: they are capable of being decomposed into simpler substances.”

3. pairs of inverted commas: “. . .” large rotating air masses, known as mesocyclones, which frequently spawn twisters.”

4. parentheses: ( )“Operant conditioning refers to conditioning in which the organism . . . emits a response, or *operant* (a sentence or utterance).”

5. pairs of dashes (— . . . —): “Locke’s notion of the mind as a *tabula rasa*—a clean slate—has influenced later thinkers in a wide variety of fields.”

6. quotation marks: The use of quotation marks around a word that is not being quoted suggests it is being used with special (stipulative) meaning.

7. italics: Often used in conjunction with items #1–3 above. (Darian , 2003,p. 54).

- ***Semantic Features*** Another variety of limiting features that frequently occur in scientific and technical discourse are semantic features. The most elaborate entry is semantic modes (#13), a set of properties-relations-measures found both in short formal definitions and in longer expanded ones. Below is a detailed list of syntactic features used in framing definitions.

- ***Syntactic Features*** syntactic features are another form of the limiting features of definition, the following list illustrates the various forms:

1. An engineer is a person who designs machines, systems, or public works.	relative/subordinate clause with verb+s (third-person singular present)
2. Aluminum is a metal which is produced from bauxite.	which/that + past participle
3. Aluminum is a metal produced from bauxite.	past participle
4. A utility knife is a tool for cutting hard, thin surfaces.	for + verb+ing
5. A tangent is a straight line touching a curve at one point.	verb+ing
6. A drill is an instrument with which you bore holes.	preposition + WH word (in/for/by which/whereby)
7. A pentagon is a plane with five sides.	with 1 noun phrase (with/with the property of)
8A. N1 + VL + N2: is read, means, refers to, is concerned with, is considered: • is read: "The symbol ? is read 'not equal to.'" • means: "The term set means a group or collection." • is considered: "The archaeopteryx is considered the first bird." • is concerned with: "Thermodynamics is concerned with energy relationships involving heat, mechanical energy, and other aspects of energy and energy transfer."	linking verb (VL) (except be) used for defining N1 = Term N2 5 known word(s) (definiens)

8B. N2 + VL + N1: known as, is called • are known as: "Fish that feed at the bottom of the ocean are known as ground fish." • is called: "Moving particles that carry an electric charge are called current carriers."	
9. ". . . restrictions were eased to permit experiments in such hard-illnesses as interstitial cystitis (a painful bladder inflammation).	appositive noun phrase (separated by commas, parentheses, or dashes)to-treat
10. "Whenever one material is oxidized, another is reduced. Reduction refers to the gain of electrons. . . . In other words, the electrons which are lost when a substance is oxidized are accepted by the substance which is reduced."	expanded definition: two-or-more-sentence definition

Figure 10. A list of syntactic features used in framing definitions (Darian, 2003, p.61)

An examination for the above list reveals that syntax does not function apart from semantics and other levels of language. This is clearly seen in items number 1–7 where the syntactic, semantic, and lexical features are mutually interactive. In item number 8, the definition markers are represented by the equational verbs which are in fact parts of the lexical system that function in the semantic system. For entry number 9, the appositive noun phrase (a painful bladder inflammation) is separated by the parentheses interacts with the typographic system. The last example, entry number 10 involves all semantic features.

3.3.2.2. Classification

Another function which is important in the development of both describing and defining the paragraph is classification. It is basic to human thinking and to the scientific writings (Ahmad, 2009). Earlier on, Trimble (1985) distinguished three types of classification that have been found in EST discourse: Complete classification, Partial Classification, and Implicit classification.

3.3.2.2.1. Complete Classification

It provides the reader with three kinds of information:

(1)The term (or items) being classified. (For example, the members of the class and suggest that there is a relationship between them but it doesn't specify precisely what in fact this relationship is).

(2) The class to which the members belong.

(3) The basis for classification. (it tells us in what way the members of the class differ from one another or how they are similar.

An example of a complete classification with a finite member is given below:

Matter is frequently classified according to its electrical conductivity as a conductor, nonconductor, or semiconductor. Conductors have many electrons that are free to move and are useful in carrying, or conducting, electric current. All metals, particularly silver, copper, gold and aluminum are good conductors. Substances with few free electrons are nonconductors, or insulators Because they do not carry electric charge and can be used to prevent electricity from flowing where it is not wanted. Air, wood, glass, and plastic are insulators. A few substances, like carbon, silicon, and germanium do not fall into either of these categories. They are classed as semiconductors and are used in such electronic devices as transistor radios.

(From: English for Science by Zimmerman, 1989, p.8)

Two levels of classification have been adopted in the above paragraph. The largest class in the paragraph is "Matter". This class is classified into three major parts: conductors, semi-conductors, nonconductors which have become classes in turn. Each class has further specified numbers of elements; for example, 'silver', 'copper', 'gold' and 'aluminum'.

3.3.2.2.2. Partial Classification

Paragraphs of such a classification do not include the basis for various classifying terms; it can be easily made out from the context itself. To illustrate, Ahmad (2009) mentioned the following example of partial classification which doesn't posses explicit and absolute classification is given below:

In considering speech disorder, it's essential to distinguish between defects of articulation and enunciation of speech called "dysarthria" and distrurbances of the structure and the organization of language itself aphasia. There are four main types of dysrathria: cerebellar, pseudo-bulbar, and cortical sysarthria. The word "aphasia" means a sistrurbance of the ability to use language whether in speaking writing, or comprehending. There are several different classification of aphasia but in practice, these are largely of theoretical interest.

The above paragraph starts with two major kinds of speech disorders: the first is called “dysarthia” and the second is “aphasia” in medical discourse. Dysarthria has further been classifies into four major disorders: ‘cerebellar, pseudobulba, bullar and cortical dysarthria’ but the classification of “aphasia” has not been mentioned.

3.3.2.2.3. Implicit Classification

It possesses all classifying information inherently though explicitly they are not stated in rhetorical functions. Such a classification contains only limited categorisation which may be further enlarged through the repertoire of the readers’ knowledge. The intensive knowledge of the reader makes him capable enough to explore some more qualities in addition to those already mentioned in the paragraph.

Classification information are present in the discourse but not in the classification terms. The reader applies his own insights to explore the classifying information in a paragraph that possesses no overt purpose. The reader can then extracts information and rearrange them into a new paragraph. The paragraph which is cited below gives a better idea of such paragraph:

A similar need for research exists in the branch of hydrology that deals with the quality of water. In nature, there is no water like the pure water defined by chemists made up only of hydrogen and oxygen. River water, ground water and even rain water always contain other dissolved or suspended elements and these even when present in small quantities, play an important role.

The above paragraph contains two levels of generality: the class of the first level is “water” with the two members- “ man-made” and “natural”. Man-made water is implied by the second sentence of the paragraph. The class man-made is shown with only one member; however, there can be obviously other kinds of water along with pure water such as impure water, saline water, heavy water, etc. Also, the water gives only three

members of the class ‘natural water’ even though there are several other natural resources. Similarly, it will be worthwhile to mention that other forms of water can also be gauged from the context though the writer has failed to give us the bases for qualification. Later on, Darian (2003) highlights three modes of classification statements: Contiguous, Extended, and Nested Classifications.

3.3.2.2.4. Contiguous and Extended Classifications

Many science texts draw heavily on classifying, where readers find passages in which classifying statements follow one upon another in series. Consider the following examples:

. . . proteins [level 2] are the most diverse of all biological molecules [level 1]. They include *enzymes*, which . . . they also include molecules concerned with cell movements, storage, and transport. Many hormones are proteins; so are antibodies [level 3]. (Darian, 2003, p.76)

Four classes of [2] psychoactive [1] drugs are [3] problems in our society [tacit class: psychoactive drugs that are *not* problems in our society]. They are [4] stimulants, depressants and hypnotics, narcotic analgesics, hallucinogens and psychedelics. . . . Stimulants include [5] caffeine, nicotine, amphetamines, and cocaine. . . . [6] Coffee, tea, chocolate, and many soft drinks contain caffeine. (Darian, 2003, p.77)

Three levels of classification are illustrated in passage one and six levels in passage two above. In this way, classifying can be seen more as a discourse-level than a syntactic-level phenomenon. While there are discrete sentence-level patterns, the process of classifying often involves a passage of several sentences for the writer to present the various levels of the classification.

3.3.2.2.5. Nested Classifications

The other type of classification is "nested classifications": single sentences containing classifications at more than two levels, as in the following examples from Darian (2003, p.78):

Many hormones, including sex hormones, are steroids.

Among [1] the lipids [2] that have no fatty acid tails, we find [3] the steroids. . . . You have probably heard of [4] cholesterol. This steroid is a key component of animal cell membranes.

In the first sentence three levels of classification are illustrated, *steroids* [level 1] is superordinate to *hormones* [level 2], which is superordinate to *sex hormones* [level 3]. In the second example, four levels are clearly illustrated in the two sentences.

Classification, in fact, as Darian (2003) believes does not occur in isolation in most of the cases. Basically, classifying and defining are so bound up together that it is hard to imagine one without the other. To illustrate, the presence of a class word is an important element in a formal definition. In this respect, to illustrate the idea of combining definition and classification in scientific writing, Darian (2003, p.66-67) presents the two following examples:

(1) A mixture is a material containing two or more substances [definition] and can be either heterogeneous or homogeneous [classification]. Those forces that hold oppositely charged ions together or that bind atoms together in molecules are called chemical bonds. The two principal types of bonds are the ionic bond and the covalent bond.

(2) The sum of all chemical reactions that occur within a living organism is defined as metabolism. Many hundreds of chemical reactions occur in a typical cell. To make sense of this myriad of reactions, biochemists have subdivided metabolism

into two contrasting categories [classification], anabolism and catabolism. Anabolism is the process by which [definition] . . . Catabolism is the process by which [definition] . . .

In example (1), there is a combination between definition and classification. The first part of the sentence represents a formal definition that involves *mixture* as the word being defined, *material* the class word, and *two or more substances* the limiting feature. The second part involves a classification of the term mixture which is developed in the next sentence.

Example (2) is a good illustration of how definition and classification can be intertwined in a next. In this example the author starts with presenting the categories (classifying metabolism) then provides definition for each category (Anabolism and Catabolism).

Still, it can be isolated to be studied on its own dealing with all classes and their main members-unlike definition which deals with only one member of a class. In expressing the concept of classification, writers use some lexical elements which can be arranged in four groups, according to Darian (2003):

• ***nominal (nounlike) classifiers:*** This list involves almost fifteen or sixteen nouns or noun phrases used to indicate a classification: *branches, category, class, classification, example, division, families, a form of, group, grouping, kind(s) of, set, sort of, subdivision,* and *type of.* Of these, the most common words are: *category, class*, and *type of.*

• ***verbal (verblike) classifiers:*** There are nine verbal forms used to indicate a classification *class, classify, be classified, distinguish, divide, fall into, grouped*, and *separated.*

• ***multiple classifiers and concordances:*** This group is made up of combination between the nominal and verbal classifiers. The most common are: classified (pass) into

branches, groupings; fall into types, categories; divided into groups.

• ***words in multiple forms:*** It involves different parts of speech of the word; for example: class (n), class (v), classification and group (n), grouping, group (v).

To conclude the discussion on the rhetorical items, it is important to highlight the importance of these items in the organisation of scientific and technical texts. For that, EST students should be given a great deal of exposure to these items in order to appreciate and make use of the information in a text. To equip learners with the rhetorical items, these items should not be taught in isolation but in context and as central elements in typical collocations. With respect to teaching rhetorical items, Baker (1988) believes that the ESP teacher should attempt to draw the learner's attention to the following: 1. The type of text in which the learner can expect to encounter it, 2. The section in which the item is used, 3. The typical patterns in which it occurs.

Conclusion

This chapter sheds some light on the various issues underlying reading as an essential skill in learning in the field of science and technology. This chapter drew a clear picture of the GE/ EST dilemma in teaching English in science institutions where most students suffer from the low language proficiency. For most students, science texts are challenging because of the unknown vocabulary and the difficult rhetoric organisation of texts. For that matter, a whole section is devoted to highlighting the relationship between vocabulary and EST including the role of both the technical and non-technical words in building the students' comprehension. In addition, the section showed the different rhetorical functions and techniques that exist in scientific discourse. Furthermore, the various aspects of knowledge of the text structure are presented with a detailed explanation and illustration of Trimble's (1985) rhetorical functions of definition and classification.

Chapter Four

Framework of the Research

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Framework of the Research

Introduction

This chapter describes the research design and the methodology employed in this study to meet the research aims, objectives and requirements. It also presents a description of the experimental design used and the reasons behind choosing it together with the tools of research used in testing the research hypotheses. Furthermore, it provides a wealthy explanation of the phases we have gone through in the present inquiry. Next, it presents a detailed overview and a description of the pilot study. It also deals with the implementation of the main experiment providing description for the objectives, the participants, materials and steps, each of which is developed in a different section. Finally, the chapter presents the framework chosen for analysing the data with a discussion on the possible ways in interpreting the results obtained.

4.1. Research Methodology

According to Kothari (2011), doing research is for the purpose of discovering answers to questions through the application of scientific procedures. In this study, the purpose is investigating the teaching/learning of English for science and technology at the University of Constantine 01; in particular, answering the question of whether implementing GE reading courses to our subjects would have any progress in their reading performance. For that reason, we have chosen to conduct a case study in the Department of Electronics, University of Constantine 01. Then, we opted for the action research along with the experimental method to approach our investigation.

The choice of the research methodology and the research methods are determined by the nature of the topic investigated and dictated by the problem explored in the study. In fact, we have selected to conduct a case study simply because our inquiry is carried out to answer the questions mentioned above in the introduction about teaching of English in a specific context. In addition, we have followed the quantitative approach because it is applicable to phenomena that can be expressed in terms of quantity or amount (Kothari, 2011) in order to generate statistics through the use of large-scale survey research (Dawson, 2002).

To achieve the objectives of the study which is improving students' achievement that demand an active role from the teacher, or the researcher. As result, it has been opted for the action research that is regarded as the best effective way to have based on researcher involvement in his research. In this investigation, the researcher is the practitioner who aims at bringing about change in the learners' achievement in English course.

Among the wide range of methods suggested by the literature on research in education, the researcher has opted for the experimental method because it helps to control how the control and the experimental groups are treated, and measures how the treatment affects each group (Lodico et al., 2006). In technical terms, this inquiry was based on investigating the changes of the independent variable (implementation) and examines its effects on the dependent variable (reading comprehension). The experimental method is by far the most convenient method to test our hypotheses because it enables the observation of the effects of the variables manipulated on other variables within a controlled research environment (Kothari, 2011).

4.2. Population and Sampling

The target population is that of electronics students at University of Constantine 01, where this study was conducted. From this parent population, Master One students of Electronics (2011 – 2012) were selected to be our accessible population. We have selected this population for two reasons. First, at this stage, Master One students are aware of the importance of English as the language of science and thus they seem motivated to learn it. Second, they are going to write research projects and they will consult and read documents in English, and thus they expressed their willing to collaborate in this research. In this study, we have used total population sampling technique which involves selecting the entire population, purposively. We have opted for this technique in sampling because the size of our population is relatively small seventy two (72) students. Students of the sample were randomly grouped into a group for conducting the pilot study, an experimental group, and a control group for the experiment. The subjects have studied English for six years and they were in the seventh year at the time of the study. They had two years at the Elementary school, three years at the Secondary school, and one year at the graduation level.

4.3. Data Gathering Tools

Data gathering tools are those research methods used by the researcher in collecting the data (Dawson, 2002). The main tools used in this research are questionnaires, a test and classroom observation.

4.3.1. The Questionnaire

The questionnaires were used in this study because they are highly structured data collection instrument, which are, using Dornyei's (2003) words, "easy to construct,

extremely versatile, and uniquely capable of gathering a large amount of information quickly in a form that is readily processable". In this study, the questionnaire is administered to all the subjects for the sake of gathering information about their needs, lacks, deficiencies and preferences in learning English.

4.3.1.1. Aims of the Questionnaire

The aim of the questionnaire is to provide rich insights into the learners' needs and language needs in connection to the reading skill. The questions were designed to gain information about the respondents' proficiency in English, reading level and learning habits. They elicit their reading needs, attitudes, and difficulties and deficiencies in English. In addition, they evenly sought to investigate learners' preferred approach to learning English and the learners' needs in terms of language skills and tasks and teacher roles.

4.3.1.2. Description of the Questionnaire

An interactive questionnaire of twenty-one questions was designed (See Appendix 2),we have purposefully used more closed-ended questions as their coding and tabulation is straightforward and they are particularly suited for quantitative, statistical analyses (Dornyei, 2003). Except for the last question where we used an open-ended question for the simple reason that we do really need to know the respondents' answers in order not to limit the range of possible answers. The respondents are provided with ready-made response to choose from by ticking (√) in the appropriate box. In some items, the last alternative 'others, please specify' require the respondents to produce any free writing if they do not prefer any of the codes (answers) listed using any of three languages (Arabic which represent their first language, French their second language, and English their third language) as to transmit the message. This

questionnaire is made up of short questions written in simple English grouped in five sections: Students' learning habits and situation, needs and preferences in learning English, reading attitudes, reading comprehension difficulties, and further suggestions. This questionnaire (See Appendix 2) is divided into five sections as follows:

Section One: Students' Learning Habits and Situation (Q1- Q 05)

In this section, we seek to gather information about the students' attitudes towards the English language (Q.1), their level in English (Q.2 & Q.3), and students' attitudes about the time allocated to the English session (Q.4) and the courses given (Q.5).

Section Two: Students' Needs and Preferences in Learning English (Q6 – Q10)

Questions of this section seek to have information about students' needs and wants in learning English (Q.6, Q.7, and Q.8), their preferences in learning in terms of skills and tasks (Q.9) and their most important skill (Q.10).

Section Three: Reading Attitudes (Q11- Q15)

The questions of this section aim at gathering information about the students' attitude towards the reading skill. The response items involve the students' frequency of reading (Q.11 and Q.12), materials and topics they read (Q.13 & Q.14), and reasons for reading (Q.15).

Section Four: Reading Comprehension Difficulties (Q.16 – Q.20)

In this section, we attempt to depict the source of the reading difficulties that the students' face. In this respect, questions (Q.16, Q.17 and Q.18) are devoted to identify the students' levels and frequency of difficulty. In relation, (Q.19 and Q.20) are asked to determine the aspects that which affect the students' comprehension.

Section Five: Further Suggestions (Q 21)

This section is devoted to the students' comments or suggestions to make the English course more effective and useful (Q21).

4.3.2. The Tests

Furthermore, the other research tool is the test. For the present study, two types of tests are used; proficiency tests (linguistic tests) and comprehension tests.

4.3.2.1. The Proficiency (Linguistic) Tests

Proficiency tests were implemented during the present study at the beginning of every unit to assess students' knowledge of language that will be introduced in the unit and it is referred to as 'Entry Test'. It is an important step in our investigation because it allows us to assess our students' linguistic knowledge when they enroll in our class; especially, their knowledge of grammatical structures, rhetorical function and non-technical and general vocabulary words. These tests have been compiled by the researcher.

In the present study, two Entry tests are used, one in "Unit 01" and the other in "Unit 02" (see Appendix 4 and 5). Each test is made up of three exercises that cover the three aspects mentioned above in context. Subjects were asked to do it individually in class during 45 minutes. Based on the results, we adjusted our assumptions about the aspects and the way to tackle during the subsequent lessons.

4.3.2.2. The Comprehension Tests

In addition to the linguistic tests, four comprehension tests were used in the present study; before, during and after the treatment period. The tests were implemented to assess students' comprehension. All the tests consist of a reading passage along with five activities, (see Section 4.6.2.4.1.2), which are developed by the teacher. The four tests are organised in a form of an observation grid.

The subjects were asked to read the text and answer the comprehension questions individually in class during 60 minutes. In attempt to make the answers individual and

make them reflect to a large extent individual abilities, we have changed the order of the statements in some of test papers to avoid having them cheating. In other words, the first statement or alternative in one paper can be the third or last, for example, in another.

4.3.2.2.1. The Pre-test

The pre-test was administered prior to the study to both groups. The text is an authentic passage from *The Structure of Technical English* by Herbert, (1965), p. 124 entitled as "Conductors and Conductivity" and it contains 465 words, but it is used without a title in the test (see Appendix 3). The text is a self-contained text which does not necessitate knowledge of the previous and subsequent parts in the book. It is an expository text that involves definitions and classification.

4.3.2.2.2. The Exit Tests

Another comprehension test is designed to test the subjects' reading comprehension at the end of each unit to measure the progress in the comprehension achievement which was labeled "Exit Test". Two Exit Tests were used in the investigation, each of which is implemented to check what learners have acquired in every unit; i.e, Exit Test 01 at the end of Unit 01 and Exit Test 01 at the end of Unit 02. It serves as a feedback for the researcher for the progress of the work (as an observation grid).

The Exit Test 01 is based on an authentic passage of 241 words entitled "Electronics Vs. Electricity" from" Electronics Explained" by Frenzel (2010, pp.6-7) (see Appendix 5). The text is a self-contained, i.e., it does not necessitate knowledge of the previous and subsequent parts in the book. It is an expository text that involves the rhetorical function definitions.

Concerning Exit Test 02, it contains an authentic passage of 305 words entitled "Resistors" from "Field of Electronics" by Morrison (2002, p.109) (see Appendix 7). Similarly, the text is a self-contained, not necessitating knowledge of the previous and subsequent parts in the book. It is an expository text that is dominated by the rhetorical function classification.

4.3.2.2.3. The Post- test

The post-test was administered after the treatment period. The text is an authentic passage taken from "Batteries" and it contains 521 words. It is taken from a specialised book in Electronics entitled as "Electronics Explained" by Frenzel (2010, p. 31) and it is used without a title in the test (see Appendix 8). The text is a self-contained text which does not necessitate knowledge of the previous and subsequent parts in the book. It is an expository text that involves definitions and classification.

4.4. The Observation

The third tool used in this study is the observation. It is an essential method to understand the learning situation and the students' behaviour. Both types of observation: structured and unstructured were used in the present investigation. The former was used to better understand the students' performance through tracking the development in the participants' performance through the four comprehension tests employed (see Section 4.3.2.2). The latter was used to get an inside view of reality and focuses on individuals behaviour in class.

The structured observation is constructed in a form of a grid of tests that can help in testing the hypotheses. The unstructured observation is done in a form of notes based on taking note of what seems interesting for the researcher. The purpose behind using this method is to describe the general behaviour of students in the classroom. Richards

(2004) states that not all the aspects of the lesson can be observed for that we limited our focus to the following points:

- Identifying some of learners' needs and lacks through observing the students' language performance in class.
- Students' motivation and interest towards the lessons (students'reaction, interaction and questioning).
- Time on task.

4.5. The Pilot Study

The pilot study is a mini version of full-scale study which has provided information about the possible problems and sorts out the weaknesses of the research design. It aims at checking the feasibility of the research instruments. For the study, the pilot study involves piloting the questionnaire and the tests (Entry Test 1, Entry Test 2, pre-test, and post- test).

4.5.1. The Pilot Questionnaire

Piloting is a stepwise process of constructing a good questionnaire. This pilot study was carried out to check validity of the questionnaire as a tool in revealing the information needed, test out the students' reaction to the questions asked, and acquire more codes for some questions.

The pilot questionnaire was handed to ten (10) students who were randomly selected. Four questions were added to the questionnaire in a separate sheet 'An evaluation Sheet' in order to evaluate the items of the questionnaire (the length, structure and wording of the questionnaire). The researcher was present to answer any raised questions by students and to write down the student's comments and observe their reactions.

4.5.1.1.Analysis of the Pilot Questionnaire

Table 01
The Ambiguous Questions

Answers		Nbr. of Students	%
Yes	Q.06	02	20%
	Q.07	02	20%
	Q.16	03	30%
	Q.20	03	30%
Total		10	100

Table 02
Unclear Words

Answers		Nbr. of Students	Percentage
Yes	Last up to date	03	30%
	Need	01	10%
	Learn	01	10%
	Field	02	20%
	Affects	01	10%
	Background knowledge	01	10%
No		01	10%
Total		10	100

Tables 01 and 02 above summarise the students' responses about the ambiguous questions and the unclear words in the questionnaire. The questions which are highlighted by the respondents as unclear or difficult to understand are question 6, 7, 16, and 20. To make it clear, these questions were reformulated either by checking and replacing the difficult words or by re-stating the question in clear way. Results of the above tables were taken into consideration in bringing about the following changes in the questionnaire.

Question 02 '*Your level in English is',*

Most of the students commented on the alternative "low" asking for the code "very low" which was added in the final version along with the item "very good". The codes "good", "average", and "low" proved that they do not cover all the possibilities.

In Question 06 '*What do you need English for?*'

Responses to this question show that the subjects mixed between want and need in answering; for that, we explained both terms to learners and reformulated the question and make it clear for them; *What do you need/ want English for?* In addition, the items: 'reading documents in your field of specialism', 'to get a job' and 'writing scientific reports and scientific papers' have been added by subjects. Accordingly, the item 'succeeding in your studies' has been dropped as it can be included within the item "passing exam". Besides, the word 'last up to date' was replaced by 'recent' as some of the respondents asked about its meaning.

Question 08 '*According to your needs, the English course should contain'*

The item 'reading comprehension' was replaced by 'reading and comprehending documents related to your field of speciality' which is more precise. In addition the item 'analysing texts' was a superfluous item.

Question 13 **'***What do you read in English?'*

The item 'books' is deleted as we believe that the books they read falls with the item "documents related to your field". Further, 'e-mails' is offered by subjects.

Question 17 *'How do you find what you read in English?*

This question was reformulated as follows 'How do you read in English?'. Hence, the items used 'easily, 'fairly easily', and 'with difficulty have been placed to substitute 'very difficult to understand', 'difficult to understand', 'easy to understand' and 'very easy to understand'.

Furthermore, the explanation or rather the translation into Arabic of difficult words mentioned in the table above was considered in the administration of the questionnaire. Finally, the researcher was recording the time that subjects spent in completing the questionnaires. It ranges from 08-19 minutes (Table 03) which is deemed to be a reasonable one.

Table 03
Time for Filling in the Questionnaire

Time	Nbr. of Students	Percentage
18 mn.	02	20%
15 mn	01	10%
13 mn.	03	30 %
08 mn.	04	40 %
Total	10	100

4.5.1.2. Discussion of the Pilot Questionnaire

A primary analysis of the subjects' responses proved that the data collected from the questionnaires could be a foundation for fruitful discussion concerning the learners' level in English, needs and reading comprehension problems. In this section, a summary of the preliminary data is presented.

Table 04
The Summary of the Pilot Questionnaire Results

The Questions	The Findings
Q 01	The majority of the subjects (70%) said they like learning English.
Q 02	Most of the participants believe they have a low (60%) and an average (30%) level in English.
Q 03	For 70% of subjects, their present level in English does not allow them to learn scientific English.
Q 04	Taking the number of sessions devoted to teaching English into account, 50% of the students said it is acceptable and 20% of them said it is enough.
Q 05	The majority of respondents (60%) state that there is a slight contribution of the courses in developing their level in English.
Q 06	Concerning the students' needs, reading (70%), writing (60%), and getting information (60%) are all what students need English for.
Q 07	Both technical English and General English are what the majority of the subjects (70%) need to study.
Q 08	With respect to the learners' needs, general vocabulary is ranked first with (23,07%), technical terms and comprehension second with (15,38%), grammar exercises and writing skill are ranked in the third and fourth place with (12,82% and 10, 25%, respectively).
Q 09	In their answers to this question, students believe that reading and understanding is useful in learning English with (45,45%).
Q 10	Students ranked reading as the most important skill, followed by writing, then listening, and finally speaking.
Q 11	90% of students said they read in English.

Q 12	Concerning the frequency of reading, 70% of our subjects opted for "sometimes"
Q 13	Students expressed their interest in reading "texts of exams" (38,88%) and "articles in the Internet" (33,33%).
Q 14	"Electronics" (23,80%), "Science" (33,33%) , and "Global events" (28,57%) are the most topics read by students.
Q 15	Our subjects read in English for two reasons: because they are recommended to (28,57%) and the information they need are available in English (50%).
Q 16	Half of the respondents said that "full sentences" are all what they understand while reading; the majority of the second half (30%) understand the "general idea".
Q 17	70% of the subjects find difficulties while reading in reading.
Q 18	In terms of the frequency of difficulty, 40% of the participants said they "always" encounter difficulties in reading English texts and 40% opted for "sometimes" .
Q 19	70% said that their comprehension difficulties exist at all levels; mainly understanding the relationship between ideas (40%) and understanding words (50%).
Q 20	For the sources of difficulty, technical vocabulary (22,72%), general vocabulary (13,63%), and grammatical structures (22,72%) are listed in the first places, followed by topic of the text (13,63%) and length of the text (13,63%).
Q 21	For the students' suggestions, 30% of the subjects recommend no changes at all, the rest 70% suggest changes at the level of the number of sessions (20%), and content of the course, including reading (10%), writing (10%), translation (10%), grammar (10%), and using Arabic as a medium of instruction (10%).

The results obtained from this questionnaire (Table 04) allowed us to understand who our students are and what kind of attitudes they express towards learning English. Basically, the pilot questionnaires revealed that subjects have a positive attitude towards learning English (Q.01) and expressed their interests in having more session of English (Q.04). Besides, it informed us not only about the subjects' level in English which is described as low and very low (Q.02) but also proved that they have a very poor reading level (Q.16, Q.17, & Q.18).

In addition, the data gathered from the questionnaires revealed that subjects' needs are related to both general and technical English (Q.07 & Q.08) with focus on the reading skill (Q.09 & Q.10) as a means of getting information and improving their level in English, thus passing exams (Q.06). The results obtained allow us to understand the nature of the difficulties they have which are mainly concerned with language (Q.19 & Q.20).

Taking into account the aims of the questionnaire, the subjects' responses proved the adequacy of the research design and the adequacy of the questionnaire as a good tool that meets the design requirements. On the other hand, the pilot questionnaire reveals that the subjects' responses have brought a valuable feedback on the overall appearance of the questionnaire, the clarity of the instructions, the length of time necessary to complete the questionnaire and the wording and the ambiguity of the questions asked.

In short, based on this information, we believe that this questionnaire performs the job it has been designed for and shows no apparent limitations. For that, only the aforementioned changes are made in the final version of the Students' Questionnaire (See Appendix 3).

4.5.2. The Pilot Tests

4.5.2.1. Description of the Pilot Tests

In the present research, we did not carry out a pilot research *per se* for the experiment because of time constraints but we rather piloted the materials (reading passages and the activities) used in the inquiry to have a clear picture of their usefulness in achieving the objectives.

As a point of departure, a list of topics of is handed to all participants to choose what is more interesting for them. Following the titles chosen by students, we have looked for texts that suit the subjects' level and interest and the requirements of the experiments. Before making the final decision about the texts to be used in the experiment, we talked to two teachers of Department of Electronics who have experience with English, to help us in grading them in terms of difficulty and interest to students. We have selected texts on their subject matter with an emphasis on general

subject-matter texts. In organising the texts into units, we relied on what we have built from the literature review.

Next, 07 students (those who participated in piloting the questionnaire, except three who were absent) have participated in this phase of piloting the tests. Again, because of time constraints we limited our pilot study to the linguistic tests (Entry Test 01 and Entry Test 02) and pre-test and post-test. The tests were administered to the students in their regular English sessions under the supervision of the researcher. The respondents were given 45 minutes to deal with each linguistic test and one hour to deal with every comprehension test. To increase the students' motivation and to decrease their stress and anxiety, we made them understand that the tests are part of the continuous evaluation which will improve their final marks at the end of the semester.

4.5.2.2. Analysis of the Pilot Tests

4.5.2.2.1. Linguistic Tests

Table 05

Results of the Pilot Study of Entry Test 1 and Entry Test 2

	Entry Test 01		**Entry Test 02**	
	Nbr. of correct answers	%	Nbr. of correct answers	%
Grammatical structures	19	54,28	13,5	38,57
Rhetorical functions	20,5	28,57	24	34,28
Vocabulary	13	37,14	18	51,42
Average	52,5	37,5	55,5	39,64

As it can be read from Table 05, students' average scores are 37,5% for Entry Test 1 and 39,64% for Entry Test 2. For Entry Test 1, 54,28% of the students' answers to the first exercise are correct; 28,57% for exercise two and 37,14% for exercise three. In

contrast in Entry Test 02, 38,57% of the subjects answers are correct in exercise one; 34,28% in exercise two, and 51,42% in exercise three . These percentages indicate that these exercises are of an average difficulty which proves their suitability to be used in the main experiment. In addition, they reflected the students' poor linguistic knowledge.

To sum up, the analysis of students' answers to Entry Test 1 and Entry Test 2 proved that the design of this test is adequate for testing students' linguistic knowledge. Besides, it proved that the time allocated for the test is more or less sufficient and the activities used are affordable in terms of difficulty/easiness.

4.5.2.2.2. Comprehension Tests

As it is mentioned above, we limited our piloting to pre-test and post-test. In this phase, after the administration of the two tests, the subjects are provided with an evaluation sheet (see Appendix 14) that contains five questions about the texts and the activities. What follows is the analysis of the usefulness of the comprehension tests.

Table 06
Students' Feedback on the Texts Used in the Pre-test and Post-test

The Questions		Pre-test Text		Post-test Text	
Q.1How much are texts interesting to you?	Interesting	06	85,71%	05	71,42%
	Acceptable	01	14,28%	01	14,28%
	Not	00	00%	01	14,28%
Q.2 Is the text used?	Long	00	00%	01	14,28%
	Acceptable	07	100%	06	85,71%
	Short	00	00%	00	00%
Q.3 In terms of difficulty, how do you find the text?	Difficult	02	28,57%	02	28,57%
	Acceptable	04	57,14%	05	71,42%
	Easy	01	14,28%	00	00%

According to our subjects the texts chosen in both tests are within the area of interest of our subjects, 85,71% of the subjects (N= 07) opted for interesting for pre-test text and 71,42% of them for the post-test text (Table 06). For the texts' length, the subjects think that it is acceptable (100% for the pre-test and 85,71% for the post-test, (Table 06). Similarly, the majority of the respondents believe that the text difficulty is acceptable (57,14% for the pre-test and 71,42% for the post-test).

Table 07

Students' Feedback on the Activities Used in Pre-test and Post-test

The Questions		Pre-test					Pos-test				
		Dic.	M.C	G.M	I.T.	G.F.	Dic.	M.C	G.M	I.T.	G.F.
Q.4How did you find the activities	Difficult	14,28%	00%	28,57%	42,85%	28,57%	00%	14,28%	00%	28,57%	28,57%
	Acceptable	28,57%	57,14%	57,14%	57,14%	71,42%	42,85%	57,14%	71,42%	42,85%	71,42%
	Easy	57,14%	42,85%	14,28%	00%	00%	57,14%	28,57%	28,57%	28,57%	00%
Q.5 Are the instructions clear?	Yes	100%	100%	100%	71,42%	85,71%	100%	100%	100%	57,14%	85,71%
	No	00%	00%	00%	28,57%	14,28%	00%	00%	00%	42,85%	14,28%

As it can be read from Table 07, most of the students opted for acceptable to indicate the difficulty of the activities used in both tests. In addition, most of the respondents agree that the instructions are clear.

Table 08

Students' Results in Pre-test and Post-test

Activities	Pre-test		Post-test	
Dichotomous	9,5	45,23%	10	47,61%
M.C.Q	17	60,71%	16	57,14%
Meaning Guessing	15	42,85%	16	45,71%
Information Transfer	12	42,85%	11	39,28%
Filling the Gap	6,5	23,21%	5,5	19,64%
Total	60	100%	58,5	100%

It seems from the results summarised in Table 08 that the percentages of the correct answers are average for all the activities in both tests, except the “Gap filling” which received the lowest number of correct answers (23,21% for pre-test and 19,64% for post-test). However, these percentages do not show that these tasks are difficult for learners as it is indicated in their responses in Table 07 above.

4.5.2.2.3. The Results of the Pilot Test

From all what is said above, the design of tests is proved to be accurate, the reading passages were regarded as interesting for learners (Table 07), the questions were affordable and the time allocated was sufficient, as recorded by the researcher. In addition, the primary results of the pilot study revealed that these tests test what they are intended to test. Yet, the only weakness revealed by the pilot study particularly by the non-verbal behaviour of participants is the use of multiple choice questions which proved to encourage cheating. Therefore, we have decided to change the order of the alternatives from one copy to another. In brief, the pilot study has proved the effectiveness of the tests as reliable instruments for measuring students’ linguistic knowledge and reading performance.

4.6. The Main Study

4.6.1. The Questionnaire

Questionnaires (see Section 4.3.1) were administered to the research sample (N= 58) during their regular English session. Students were permitted to ask for clarification. All the questionnaires were handed in. The results and the analysis of data gathered from the questionnaire is fairly discussed in the next chapter.

4.6.2. The Experiment

In an attempt to check the research hypotheses, an experiment was conducted during the regular English sessions of Master One students of the first semester and during a few sessions from the second semester of the academic year 2011-2012 at the department of Electronics, University of Constantine1. The students were divided into two groups (an experimental and a control group) with a different treatment for each group.

4.6.2.1. Participants

The researcher and the Master One students of Electronics are the only participants in the experiment who performed complementary roles during the treatment period. The researcher was the only teacher who participated in teaching both the Experimental group and the Control group. For the students, they were randomly divided into two groups: Experimental group and Control group of 31 students each. The number of participants is reduced later to 29 students in each group because of the absences of some participants consequently eliminating their papers. None of the groups were informed about their participation in the experiment in order not to bias their learning behaviour.

The experimental group was introduced to the reading course developed by the researcher (see Section 4.6.2.4); and with the control group, the researcher has kept the same method of teaching that students were familiar with the Grammar Translation Method. The treatment period lasted for about 15 weeks, including weeks in which the pre-test, the post-test, and the questionnaire were administered.

4.6.2.2. Objectives of the Experiment

The general objective of the experiment is to enable the subjects to handle the written language in their field of speciality. The specific objective is to make subjects

able to read and understand as effectively as possible their subject-matter texts using the linguistic features of the text, thus, improving the students' reading comprehension for the purpose of getting information and boosting their language learning. Equipping students to identify and make use of the priming devices of discourse; namely, grammatico-rhetorical relationships became a central focus of our reading instruction. In other words, the main goal is to make a sound improvement in the teaching of English for Science and Technology for Electronics students as much as we hope to integrate our implementation in the curriculum.

4.6.2.3. Materials Used in the Experiment

References by (Allen & Widdowson,1974; Zimmerman,1989; Glendinning & MacEwan, 2001; Blattes, Jans, &Upjohn , 2003; Brieger & Pohl, 2004; F. Eskey, 2005; McComb & Boysen, 2005; Bonamy, 2008; Frenzel, 2010; Bishop, 2011) were in the process of selecting and designing the materials for the experiment. These references are either used explicitly (extracting parts) or implicitly (taking ideas) in the design of the experiment.

For the units used in the implementation, we adopted the same structure of units used in "English for Science" by Zimmerman (1989) a book for intermediate and advanced second language learners of science. Besides, "Minimum Competence in Scientific English" by Balattes,S., Jans, V. J. Upjohn (2003) was for the Entry Tests and the Exit Tests. The rest of the materials listed above are used as sources for texts, supports for grammar, and /or tasks and activities, as it is clearly illustrated in the appendices of the units.

"English for Science" is a textbook which integrates the four basic language skills to facilitate the leap from basic General English to academic English to prepare students to comprehend and use college-level science material. The book aims to develop critical

thinking and inquiry. The chapters are organised around the rhetorical functions used in scientific discourse. Each rhetorical function is introduced in a short reading passage and developed in further longer reading passages. Topics are selected from the general science to serve as a vehicle for rhetorical functions, syntactic constructions, and vocabulary items frequently used in scientific discourse. All these features make, we think, the reference a suitable book to use in our treatment during the experiment.

4.6.2.4. Content of the Experiment

The experiment consists of an implementation of two units that focus on GE language and general subject matter EST topics which are developed by the researcher. It aims at shedding light on how the subject matter –Electronics- is expressed through English. In addition, it seeks to help students use their linguistic knowledge in building meaning and getting information while reading.

4.6.2.4.1. Units

We have selected only two units: Definition and Classification from the book mentioned above, "English for Science", to use during the experiment due to time constrains, only one session (one hour and half) per week. Furthermore, we have used only the parts of the units that highlight the reading skill only as it represents our main concern in the present study.

As it is clearly illustrated in Figure 11 below, each unit is built up on three main elements which are interrelated:

1.Rhetorical function: In each unit, one of the widely used rhetorical functions in science is highlighted for discussion. The unit starts by introducing the rhetorical function, relating it to the scientific method and presenting it in a short reading passage (Text 01, see. 4.6.2.4.1). Students were supplied subjects with a text, purposefully

chosen as an illustration, and were asked to read and identify the function used, how it is used and the reason for using it. Then, the informants were given practice on the function highlighted; this step is preceded by providing the subjects with a handout about the language patterns. Finally, students were made practice the function.

2.Grammatical structures: The emphasis is given to the grammatical structures that are frequently used and repeated in scientific English, and English for Electronics is no exception. Based on the same text used in the previous section, subjects are also asked to identify the grammatical structure used to express the rhetorical function. It is important to say that the choice of the grammatical structures is related to the rhetorical function. For example, the present simple with the rhetorical function of definition and the passive voice with the rhetorical function of classification. It was assumed, according to the pilot study that the subjects have serious deficiencies in grammar and the aim of the experiment is to try to repair the subjects' deficiencies and consolidate their knowledge during the study span by supplying handouts and explanation. For that, each structure in scientific writing was explained and subjects were provided with activities to practice the structure.

3.Vocabulary: It is of great importance to focus on vocabulary because it helps the learners build their reading proficiency. In each unit, some vocabulary (non-technical) items were chosen from the text. Subjects were asked to guess the meaning of the selected words according to the context from the alternatives provided.

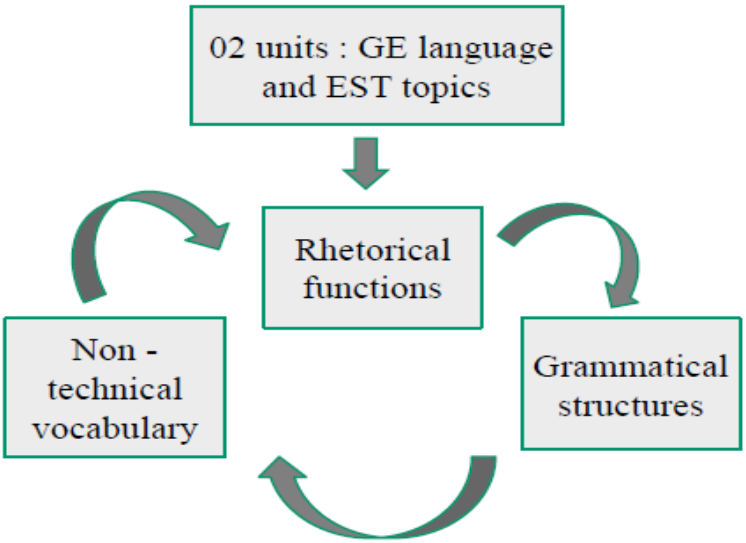

Figure.11. Structure of the units.

For the units some modifications, additions and deletions were brought about to match the specific aims of the experiment. Reviewing different sources has allowed the researcher have new insights and a lot of ideas in tackling the issue in hand. With respect to the research's objectives and the concern of our experiment (see. Figure 11), a series of lessons that meets the requirements of our research were designed and compiled. In each unit, the lessons are centred around three main sections: reading passages, activities, and reading comprehension. Figure 12, below, clearly illustrates the scheme of every unit.

On the one hand, Unit 01 (see Appendix 09) is devoted to the rhetorical function of *Definition*. It focuses on teaching students how English is used to define in science for *defining* by unveiling the differnts forms of definition that exit in the reading passage. Accordingly, students are introduced to the grammatical structures that is related with definition: the present tense and the relative clause. Subsequently, to enrich the students' linguistic knowledge on this discoursal function, they are presented to the sentence pattern used in defining together with some of non-technical words partaining

to Electronics. Finally, the focus is directed to enable students to make use of what they have acquired as a linguistic knowledge in developing their reading and understanding.

On the other hand, Unit 02 (see Appendix 10) is alloted for the rhetorical function of *Classification*. Teaching students how English is used to classify in science is the pillar of concern. In this unit, students are introduced to the different forms of classification that exit in the reading passage. Besides, it highlights and explains the grammatico-rhetorical relationships that exists between the passive voice and classification. Next, presenting the sentence patterns used in classifying together with some of non-technical words that exist in the field of Electronics is inevitable. To end up, it is nesseray to teach the subjects how to use their knowledge of the linguistic features of text introduced in the unit to read for getting information and developing comprehension.

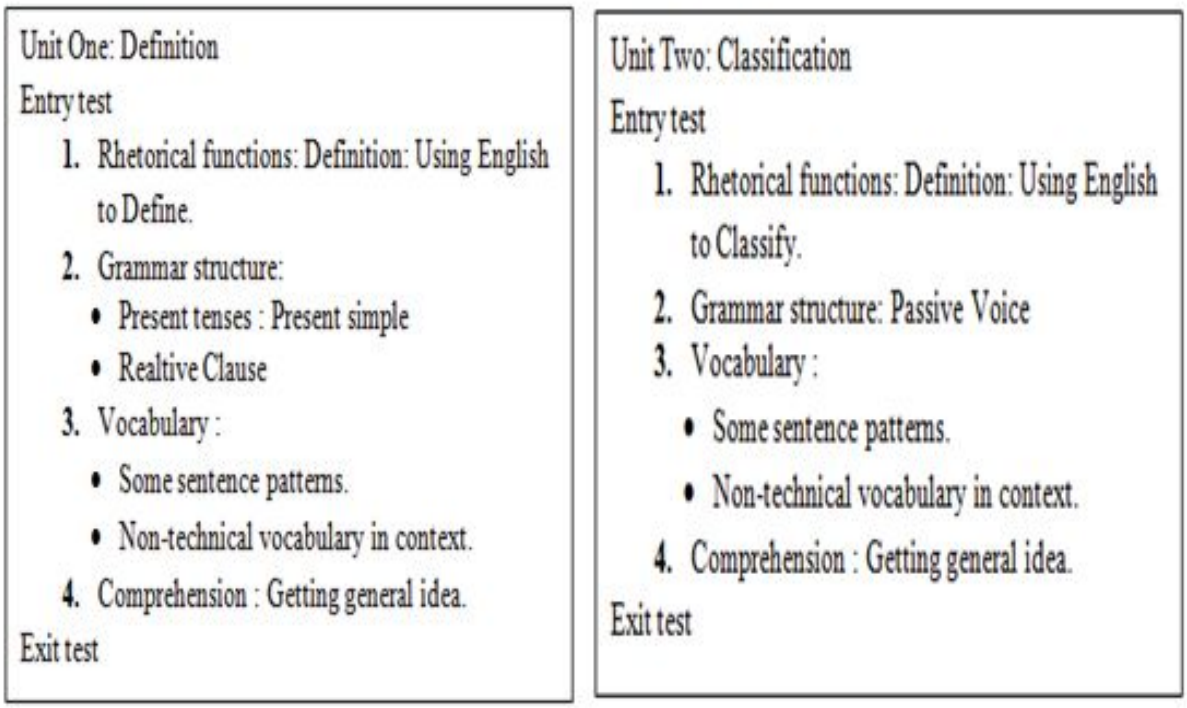

Figure 12. The content of each unit.

4.6.2.4.1.1. Reading Passages

We have selected general subject-matter texts which are easy for use with students. The aim for such a choice is to make the subjects focus on the language not puzzling over the ideas expressed in the text. In selecting texts, we adopted the criteria that favour texts which involve: language aspects needed (rhetorical functions and non-technical vocabulary) in a simple and clear way. Selecting a theme of interest and relevance, according to what students have listed about what they would enjoy reading in an EAP reading course in the second phase of pilot study, was crucially important to raise their motivation. Although, the texts have been kept simple and general length and difficulty are regularly changed. Each unit is composed of three texts.

Texts are taken from a variety of sources as books of language and books on Electronics. All the texts were from the expository writing. Following are the texts used in the experiment:

- Text 01: is used as a linguistic object (Johns, & Davies, 1983). It is used to go through the GE aspects in context. Both texts, of Unit 01 and 02, are taken from "English for Science". The first one is entitled "Forms of Energy" of 278 words and the second "Nature of Matter" of 296 words.

These texts include several examples of the grammatical structures of our concern. Through selecting examples from the texts is to enable the students to see how these structures operate in an authentic situation.

- Text 02: The second text in the units is for the purpose of practising what students have learnt from Text 01. Each text is chosen from a different source. The first one is taken from "Technical English: Grammar and Vocabulary" and it contains 141 words. Second one, is taken from Internet, is entitled "Charges of Electricity" and it contains 196 words.

- Text 03: This text is used for further practice. Each text is chosen from a different source. The first one is taken from “Technical English: Grammar and vocabulary” and it contains 297 words. Second one, is taken from *Electronics Explained* and it consists of 305 words.

- Text 04: It is used in the Exit Test to evaluate students’ progress in comprehension after each unit. Both texts, of Unit 01 and 02, are taken from a course book of Electronics entitled “Electronics Explained”. The first text is an excerpt of 241words without title. The second is a section entitled as “Conductors, Insulators, and Semiconductors” and it consists of 224 words.

4.6.2.4.1.2. Activities and Tasks

Different activities were used in this study. Some are researcher developed and others are extracted from the sources mentioned earlier. Each activity is designed for a particular aim and is given a particular time to be accomplished. Some activities were done individually, others in pairs and others in group to create a kind of movement in class and reinforce learners’ knowledge through peer discussion.

4.6.2.4.1.2.1.Pre-reading Tasks

These activities were designed by the researcher and were used as a warm up to raise students’ motivation and interest through bridging students’ knowledge with the text. Two pre-reading tasks were used in both units interchangeably for five minutes. The first activity is predicting the writer’s main idea through the title, whereas the second is pre-teaching vocabulary. At this stage, we allowed students to work in pairs to exchange ideas freely.

- Task 1: Look at the title and try to make predictions on what the text would be.

- Task 2: The questions were intended to generate the students' prediction of the text and to draw their attention to the keywords.

4.6.2.4.1.2.2.While-reading Tasks

Since the aim in using the text is to focus on particular linguistic aspects and emphasis how they are used to convey information in the scientific discourse, it was decided for two pre-reading activities that we believe encourage our students to engage in active reading and help them make sense of a text. The first activity is re-reading and the second is guessing word meanings by using context clues, both were used in unit one and unit two.

- Task 1: Read 3 times and rate your level of understanding after each reading. In the third reading answer the comprehension checks provided.
- Task 2: choose the word which had, more or less, the same meaning as the word in bold from the choices provided.

4.6.2.4.1.2.3. Post-reading Tasks

Again, we have chosen two activities for readers as the while-reading stage is completed; information transfer and filling the gaps. The reason underlying the choice of information transfer is checking whether students can identify the main idea and main details of the text with drawing a clear relationship between ideas. Accordingly, to help students use their acquired knowledge in similar readings, we opted for the gap-filling activity.

- Task 1: After you finish reading summarise the text in the suitable graphic organiser.

- Task 2: Use your knowledge of the text to fill in the gaps in the short passage provided.

4.6.2.4.1.3. Reading Comprehension

In this part of the unit, subjects were asked to read for a purpose of getting general idea and extracting as much as possible information from the text. It aimed at developing the students' ability to handle texts in their subject matter. In other words, their ability to (i) generate the overall meaning, (ii) identify main ideas, and (iii) understand academic vocabulary and text organisation. Texts with comprehension questions were administered to subjects to make students employ what they have learnt in the previous sections in building meaning from the text.

Different comprehension checks (textually explicit and textually implicit) are inserted at the end of the text. The questions, written in English, are kept easy and simply-worded. Three types of activities were used: Dichotomous question, multiple-choice questions, information transfer, contextual reference and filling the gaps.

In this investigation, the researcher wants to test is students' literal comprehension of what they read. At this level, comprehension questions are related to find information and ideas that are clearly stated in the text.

Activity One: Dichotomous Questions

The aim of this activity is to process the text quickly to establish its main ideas (skimming). It consists of presenting the students with one-sentence summary of four paragraphs of the text and asking them to find the corresponding paragraph.

Activity Two: Multiple-choice Questions

In this activity, students were asked to locate specific information in the text. In this activity, the students' reading comprehension was tested by asking them to answer eight multiple-choice questions.

Activity Three: Contextual Reference

Students were given four definitions and asked to find out the exact words which correspond to the text. In fact, literal meanings require fluency and mastery of word meanings in context.

Activity Four: Information Transfer

A list of seven connectives was given to students whose task was to determine the kind of relationship they indicate.

Activity Five: Filling the Gaps

It is a selective deletion gap-filling activity. The deleted words are all content words, and the aim of the activity is to test the students' overall understanding of the text. The topic of the text is the same as that of the main reading passage. Thus, the understanding of the main reading passage helps the students to answer this activity.

4.6.2.5. Sequence of the Experiment

Five major phases constitute the sequence of the units of our experiment which are introduced over sessions. The starting point is the entry test which tests students' linguistic knowledge about the aspects highlighted to be developed in the unit. The second phase is "introducing the rhetorical function selected presenting it in a short reading. The teacher starts by explaining the rhetorical function using examples from the short reading. The explanation is supported by a handout which includes sentence patters that show how the function may be expressed which represents the syntactic structure. Next, the teacher shifts to identifying the grammatical structure that occur frequently in science texts and serves a communicative purpose related to the rhetorical function. Afterward, the teacher explains the structure in detail with examples and supports the students with handouts that include the needed rules.

Subsequently, a number of exercises is presented to students to enable them to progress from identifying the function to using it. After that, the teacher provide students with two further passages to practise and another passage to test what they achieved. Finally, subjects are exposed to an Exit Test that evaluates their reading comprehension after the end of each unit.

At first, subjects are asked to skim the text in hand for no more than 01 minute in order to have a general idea of the text. For the second reading, subjects are asked to read the text again carefully to understand the vocabulary and the structures used to gain information. In so doing, they are asked to use what they have learnt in the previous section. After that, 15 minutes were given to the subjects to go through the comprehension questions that serve both teaching and testing purposes.

4.6.2.6. Administration of the Tests

All tests (see Section 4.3.2.2.), Pre-test, Entry Test 01, Exit Test 01, Entry Test 02, Exit Test 02, Post-test, were administered during the regular English sessions to both groups under the same conditions. Subjects were reminded to work independently.

4.7. Procedure for Data Analysis

In analysing the data gathered from our experimental design, we opted for a statistical procedure which includes descriptive statistics and inferential statistics. The former refers to the statistics that describe the population and present the data in a more meaningful way including the frequency, the mean, standard deviation; whereas the latter are applied to draw conclusions and generalisations. In the current study, the data obtained from each tool of investigation are analysed, in view of the research questions and hypotheses, then conclusions were drawn by putting it all together.

First, the data obtained from the questionnaire were analysed following a descriptive procedure with frequencies and percentages with tabulation for every item from the students' questionnaire together with cross-tabulations for comparing results. Bar charts and pie charts are used for more illustration.

Second, before analysing the results of the tests, we coded the answers in scores out of twenty. Each activity is allocated a mark according to the number of item that it contains. All the scores were summarised in tables. Later, we calculated the means and compared results using cross-tabulations and different forms of charts for illustration. To check the hypotheses, we used two statistical tests: the correlation coefficient test "r" and the t-test "t".

The correlation coefficient test "r" is a test that expresses the relationship between two variables determining if there is a positive or a negative correlation between them Since Pearson's Moment-Product Correlation Coefficient is the most common correlation coefficient test, it is used in this study with the following formula:

$$r(xy) = \frac{\sum xy}{(N)(SDx)(SDy)}$$

This test is chosen to be used in this investigation in order to test our hypothesis that predicts that there is a correlation between the students' linguistic knowledge and reading comprehension level. In other words, we need to explore the nature and strength of the relationship among the variables of interest; students' linguistic knowledge and reading comprehension.

To interpret the "r" values, we need to compare the value obtained to the norm values which ranges from "-1" to "+1". All the values that approaches "+1" refer to the existence of a positive correlation approaches; against, the ones that approaches to "-1" which refer to negative correlation. In case the (r) value equals "0" it is explained by the absence of any relation between X and Y.

The second statistical test we have chosen is the t-test. This test is used to examine whether two samples are different and whether the independent variable does have any effects on the independent variable. In our investigation carrying out the t-test is indispensable to determine whether or not there is a statistically significant difference between the reading comprehension performance of the control group and the experimental in the post-test. This test determined for us that the difference obtained between two means of two independent samples is due to chance factors or to the effects of the independent variable. In calculating the t-test, we used the following:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)\sqrt{(N_1 + N_2 - 2)(N_1 N_2)}}{\sqrt{(N_1 S_1^2 + N_2 S_2^2)(N_1 + N_2)}}$$

To determine the significance of the data obtained, we need to interpret the "t" value obtained. Interpreting the "t" value is done via comparing it (t-obtained) to the critical value set at the alpha level (α) chosen with regard to the degree of freedom (df). If the "t" obtained is lower than the "t" critical, this means that the null hypothesis is accepted the alternative hypothesis is rejected and if the "t" obtained is higher than the "t" critical the null hypothesis is rejected and the alternative hypothesis is accepted.

Conclusion

This chapter has detailed the methodology used in the present research and the reasons of choosing it. It has presented the research aims and objectives along with the methods and the tools used to achieve them. We have started our chapter by describing the three tools of research: the questionnaire, tests and the observation. In addition to that, we have explained what have gone through in all the phases of the investigation starting with the pilot study to end with the main study. Besides, it has described the

results and data collected from the pilot study which demonstrated the feasibility of the tools chosen and the instruments designed in revealing the kind of information needed. Finally, it has provided an overview on the procedures opted for data analysis which will be presented in the next chapter.

Chapter Five

Fieldwork: Situation Analysis

Chapter Five

Fieldwork: Situation Analysis

Introduction

This chapter is devoted to the presentation, analysis and interpretation of the obtained results of the students' questionnaire, proficiency tests, comprehension tests and the researcher's observations. The discussion of the results helps in understanding our students' attitude towards the reading skill –as put forward in the research hypothesis.

In this chapter, we try to show the correlative relationship between the learners 'poor level in English and poor comprehension through the statistical analysis of the findings. We also try to shed some light upon the fact that the changes and the differences in the students' reading achievements of the experimental group are due to the efficiency of the treatment.

5.1.The Students' Questionnaire

The aim of the questionnaire is to provide insights into the learners' perceived needs and language needs with focus on the reading skill. It aims particularly to identify students' needs in terms of language skills and tasks; to record the students' deficiencies concerning language skills; and to elicit the students' preferences with respect to learning styles, methodology, and teachers' roles.

5.1.1. Analysis of the Students' Questionnaire:

Following is the tabulation, description and analysis of the students' questionnaire answers. A descriptive and statistical method has been used to achieve such an aim.

Question 01: Do you like learning English?

Table 09
Students' Attitude toward Studying English

yes	No	Total
57	01	58
98.27 %	1.72 %	100%

As indicated in the above table, 98.27 % of the total respondents (N=58) answered by "yes" for learning English; against 1.72 % (one student) who answered by "no". Students' responses reflect their desire and motivation to learn the English language.

Question 02: Your level in English is?

Table 10
Students' Level in English

very good	good	average	Low	very low	Total
00	06	12	33	07	58
00 %	10.34%	20.68 %	56.89%	12.06	100%

When asked about their level in English, none of the respondents (N=58), answered "very good"; 56,89% said their level is "low"; 20,68% consider that their level is "average"; 12.06% said that it is "very low"; against 10.34% of the respondents who said their level is "good".

Question 03: Do you think your present level in English permits you to learn specialised English?

Table 11
Learning Language of Speciality

yes	no	Total
07	51	58
12.06 %	87.94 %	100%

The majority of students' (87.94 %) are aware enough of their inability to learn the specific language of their speciality; against 12.06 % who think that their level does not create problems in leaning it.

Question 04: What do you think of one session of English per week?

Table 12
Having One Session per Week

Enough	acceptable	not enough	Total
06	21	31	58
10.34%	36.20%	53.44%	100%

Concerning having one session per week, 53.44 %of the respondents believe that it is "not enough", and 36,20 % of them think that it is "acceptable"; against 10.34 % think that it is "enough". It all indicates that, students are motivated to have more than one session per week.

Question 05: To what extent do the courses given by teachers help you in learning English?

Table 13
Courses' Contribution to the Improvement of the Students' Level

completely	Partly	Slightly	not at All	don't know	Total
02	26	15	14	01	58
3.44%	44.82%	25.86%	24.13%	1.72%	100%

As it can be read from the above table that 44.82% of the total respondents (N=58) believe that the courses "partially" improve their level; 25.86 % said that these courses "slightly"; 24,13 % think that courses are not helpful at all in improving the students' level; against two students (3.44%) state that the courses given by teachers

"completely" help in improving their level; one student (1,72%) opted for "don't know".

Question 06: What do you need English for?

Table 14
Learners Needs

Responses	Needs	
	occurrence	**%**
Reading documents in your field of speciality	44	18,72 %
Writing scientific reports and scientific papers	39	16,59%
Having access to last up-to-date information	27	11,48 %
Passing an exam	36	15,31%
Surfing on the Net and chatting with friends	19	8,08 %
Getting a job	39	16,59 %
Communicating with people	31	13,19 %
Others	00	00%
Total	235	100 %

A quick look at the table above reveals that the informants are aware of their needs as well and they clearly put priorities in their choices. In addition, students' needs in English are more or less directed towards the academic success.

"Reading documents in their field of speciality" has received the highest number of answers with 18,72 %. "Writing scientific reports", and "getting a job" are ranked second with 16,59% and "Passing an exam" is ranked third with 15,31%. "communicating with people" is listed next with 13,19 % followed by "Having access to last up-to-date information" 11,48 %. For "Surfing on the Net" is ranked last with 8,08 %.

Question 07: Which type of language do you need to learn?

Table 15
Type of Language Learners' Need

general English	**technical English**	**both**	**Total**
14	10	34	58
24,13 %	17,24 %	58,62%	100%

Most of the respondents (58,62%) opted for “Both” , 24,13 % of them selected “General English”; and only 17,24 % have chosen “technical English”. Interestingly, these results are consistent with students’ responses to questions 02 and 03. Comparing tables 10 and 11, the findings demonstrate the students’ awareness of their needs in EST and their lacks in GE. In other words, they are in a dire need for repairing their GE knowledge and for acquiring the technical one to achieve academic success.

Question 08: According to your needs, the English course should have:

Table 16
What the English Course Should Offer

grammar exercises	22
	12.02%
general vocabulary	29
	15.84%
technical terms	33
	18.03%
Translation	22
	12.02%
reading comprehension	21
	11.47%
oral expression	12
	06.55%
written expression	10
	05.46%
structure of scientific English	15
	08.19%
listening comprehension	16
	08.74%
All	03
	01.63%

With respect to learners’ needs in English course, “Technical terms” were stated as most important (18.03%); “General vocabulary” is next (15.84%) followed by “Grammar exercises” (12.02%), “Translation” (12.02%), “Reading comprehension” (11.47%). Besides, **“**listening comprehension**”** and “structure of Scientific English” were also valued with 08.74% and 08.19% respectively. In addition, “Oral Expression” (06.55%) and “Written Expression” (05.46%) have received the minor number of

responses. On a same line, 03 students believe that they need “all the items”. Once again, the subjects’ responses to what the English course should offer proved that they know exactly what they need English for.

Question 09: In your opinion, which is/are the most useful way in learning English?

Table 17
The Most Useful Skill

to write scientific reports	11
	10.67%
to listen and understand	15
	14.56%
to read and understand texts	44
	42.71%
to speak (class discussion)	20
	19.41%
all	13
	12.61%

In asking students about the most useful skill in learning English, “To read and understand texts” has received the highest number of responses (42.71%). “To speak” is ranked second with 19.41%. “To listen and understand” and “To write scientific reports” are ranked next with 14.56% and 10.67%, respectively. A minor number of responses (12.61%) suggest all the ways stated.

Question 10: According to your needs, order the following skills (1-most needed to 4- least needed)

Table 18
Ordering the Skills

Order	Speaking	Writing	Reading	Listening
01	15	04	25	12
02	12	10	14	19
03	21	14	11	09
04	14	22	06	14

Table 18 summarises the students' answers about ordering the four skills according to their needs. For the most needed skill (rank 01) "Reading", has received the highest number of answers (25), "Speaking" and " Listening" also receive a significant number of answers with (15 and 12) answers respectively; while a minor number of answers is given to "Writing". For the second needed skill (rank 02), "Listening" is highly valued with 19 responses, "Reading" was listed next with 14, "Speaking" and "Writing" are third (12 answers) and fourth (10 answers). For the third skill needed (rank 03), the high number of answers is given to "Listening" (21); 14 answers goes to "Writing"; 11 to "Reading" and 09 to "Listening". For the fourth needed skill, "Writing" received 22 answers, "Speaking" and "Listening" 14, and reading 06. To sum up, students ordered the skills according to their needs as follows, reading, listening, speaking and finally writing. They listed receptive skills first, and the productive skills second. Figure 13 below illustrates how students ordered of the four language skills.

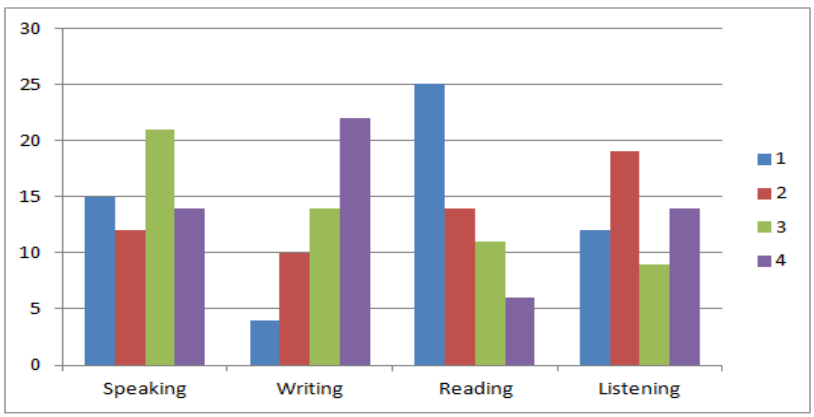

Figure13. Ordering the skills.

Question 11: Do you read in English?

Table 19
Reading in English

yes	No	Total
55	03	58
94,82%	5,17%	100%

It appears in Table 19 that 94,82% of students say they read in English and 5,17% said they do not. These results are an indication of the students' awareness of the importance of reading for them and for their studies.

Question 12: How often do you read in English?

Table 20
Frequency of Reading in English

always	often	sometimes	rarely	Total
00	06	34	13	58
00%	10.34 %	58.62 %	31.03%	100%

When asking the students about the frequency of reading in English, 58.62 % of the total respondents (N=58), opted for "sometimes", 31.03% opted for "rarely", and 10.34 % opted for "often"; and none said they "always" read.

Question 13: What do you read in English?

Table 21
Reading in English

Texts of exams	35
	28,22 %
Documents of field of speciality	35
	28,22 %
E-mails	19
	15,32 %
Internet articles of different subjects	30
	24,19 %
Newspapers and magazines	02
	1,61 %
Short stories	03
	2,41 %
Total	124
	100 %

Concerning reading habits in English, "Texts of exams" and "Documents of field of speciality" were selected to be the most read in English with 35 responses. "Internet articles of different subjects" is ranked next with 24,19 %; "e-mails" followed with

15,32 %; and “Newspapers and magazines” was ranked last with 1,61 % preceded by “Short stories” with 2,41 % .

Question 14: What are the topics you like to read in English?

When students were asked about the topics they read in English (Table 22), the highest number of responses was devoted to “Electronics” with 28,16 %; against “Economy” which received the lowest number of responses (4,22 %). On a similar line, “global events” and “science” also received a significant number of responses: 19,01 %, and 15,49 %, respectively. Further, students indicate their little interest in reading in the following “Arts and Culture” (12,67 %) “Fashion” (9,15 %) “Sports” (8,45 %) followed by “Politics” (1,40 %) an “History” (1,40 %) which are regarded as the least of their concern.

Table 22
Most Read Topics in English

Sports	12
	8,45 %
Politics	02
	1,40 %
Economy	06
	4,22 %
Electronics	40
	28,16 %
Fashion	13
	9,15%
Arts	18
	12,67%
Global events	27
	19,01%
Science	22
	15,49
History	02
	1,40%
Total	142
	100%

Question 15: You read in English because:

Table 23
Reasons for Reading in English

You are recommended to	16
	9,63 %
It's your pleasure	32
	19,27 %
You have questions to answer	27
	16,26 %
You want to improve your level	33
	19,87 %
You find the topic interesting	30
	18,06 %
The information you need are available in English	28
	16,86 %
Total	166
	100%

Concerning the reasons for reading, students stated that improving their level 19,87 % is the prime reason for their readings in English; followed by "It's their pleasure" 19,27 % then by "information you need are available in English" with 16,86 %."Having a question to answer" and "finding the topic interesting" are ranked third with 16,26 %. A minor number of answers is devoted to "You are recommended to" with 9,63 %. It's clear from their answers that their reason for reading are internal; teachers do have little role in the students' reading process.

Question 16: What do you understand when you read?

Table 24
Reading Level in English

few words	**some phrases**	**full sentences**	**general idea**	**detailed ideas**	**Total**
23	20	08	05	02	58
39,65%	34,48%	13,79%	8,62%	3,44%	100%

With respect to their reading level, the findings recorded in the table above prove that it is a low level. 74,13 % of the students stated that while reading, all what they understand is “few words” (39,65%) and “some phrases”(34,48%) . 13,79% said they can understand “full sentences”. In addition, 8,62% of the participants could grasp the “general idea”; against 3,44% of them who could grasp “detailed ideas” of what they read.

Question 17: How do you read in English?

Table 25
Students’ Reading Level in English

easily	fairly easily	with difficulty	Total
05	29	24	58
8.62 %	50 %	41,37 %	100%

The findings in the above table indicate that half of the students (50 %) read “fairly easily”, and 41,37 % of them read “with difficulty”; while only five students (8.62 %) read “easily” in English. It is clear, then that the majority of the subjects do encounter reading comprehension problems.

Question 18: If you read with difficulty, how often do you have difficulties?

Table 26
Frequency of Difficulty When Reading in English

always	Sometimes	rarely	Total
09	46	03	58
15.51	79.31%	5.17%	100%

As it can be read from the table above, 79.31 % claim they sometimes face difficulties in reading, 15,51 % claim they always suffer from it; against 5.17% who said they rarely face difficulties while reading.

Question 19: If you have difficulties in understanding, they are at the level of:

Table 27
Level of Difficulty in Reading in English

Understanding words	37
	37,75 %
Understanding complete sentences	13
	13,26 %
Understanding the general idea	09
	9,18 %
Understanding the details and supporting details	16
	16,32 %
Understanding the relationship between ideas	18
	18,36 %
All	05
	5,10 %
Total	98
	100 %

The results summarised in Table 27 about the students' difficulties in understanding shows that "understanding words" is listed as their major problem of comprehension with 37,75 %. "understanding the relationship between ideas" is ranked second with 18,36% of the responses; "understanding the details and supporting details" is listed next with 16,32%; "understanding complete sentences" and "understanding the general idea" is listed fourth and fifth with 13,26 % and 9,18 % , respectively. A minority of students (5,10 %) state that they do suffer from all the difficulties suggested.

Question 20: What affects your reading comprehension?

Table 28
Aspects Affecting Reading Comprehension in English

Organisation of information	19
	12,75%
Technical vocabulary	28
	18,79%
General vocabulary	26
	17,44%
Grammatical structures	31
	20,80%
Length of the text	13
	8,72%
Topic of the text	06
	4,02%
Lack of background knowledge	15
	10,06%
Reading strategies	11
	7,38%
Total	149
	100%

As stated in the table above, the most common problems of comprehension are "grammatical structures" with 20,80% followed with "technical vocabulary" and "general vocabulary" in second and third place with 18,79% and 17,44%, respectively. Besides, 12,75% is given to "organisation of information". Next, "lack of background knowledge" has received 10,06% and "length of the text" with 8,72%. "Reading strategies" is ranked next with 7,38%. The least reason is "topic of the text" with 4,02%.

On the other side, while examining the students' responses to question 20 above, particularly their choices concerning the type of vocabulary that creates more difficulty when reading and comprehending, we have noticed that that both types of vocabulary represent significant areas of difficulty for Electronics students as they received a very close number of responses (20- 18). Table 29 below demonstrates the areas of difficulty

in terms of vocabulary, 43,47% of the subjects opted for “technical vocabulary”, 39,13% “general vocabulary”; against, 17,39% who opted for both.

Table 29
Types of Vocabulary Causing Difficulty in Comprehension

technical vocabulary	general vocabulary	Both	Total
20	18	08	46
43.47%	39.13%	17.39%	100%

Question 21: Do you have any suggestion to make the English courses more effective and useful?

To close with the students' questionnaire, we asked informants to give their suggestions to make the course more effective. Students’ suggestions are summarised in Table 30 below (according to their frequency of occurrence):

Table 30
Students Suggestions for Improving the English Course

Having more sessions of English	32
	21,47%
Reading and understanding technical texts	27
	18,12%
Building students’ knowledge in English basics	24
	16,10%
Learning more about grammar and vocabulary	19
	12,75%
Using Arabic and French while explaining	17
	11,40%
Improving the speaking skill; in particular, in class	11
	7,38%
Translating different scientific texts	10
	6,71%
Using technology in teaching	03
	2,01%
Help us in some writing skills	03
	2,01%
Encouraging group work	03
	2,01%
Total	149
	100%

“Having more sessions of English” is the suggestion mostly suggested by students answers (21,47%). “Reading and understanding technical texts” is ranked second in the students suggestion with 18,12%. “Building students’ knowledge in English basics” and “learning more about grammar and vocabulary” are ranked as third and fourth with 16,10% and 12,75% , respectively. “Using Arabic and French while explaining” is ranked next with 11,40%. In addition two more suggestions are ranked next “improving the speaking skill; in particular, in class”, and “translating different scientific texts (Mainly from English into French).” with 7,38% and 6,71%, respectively. The least suggestions were “using technology in teaching”, “help us in some writing skills.” and “encouraging group work” with equal number of responses for each with 2,01% .

5.1.2. Discussion and Summary of the Findings

The analysis of the students’ questionnaires offered in depth insights into the real teaching and learning situation of English. The students’ responses helped in better understanding of their needs, preferences, attitudes and problems which in turn helped in designing the experiment.

5.1.2.1. Students’ Level in English and Motivation

With respect to motivation, 98.27 % of the participants expressed their positive attitude towards learning English. In the same line, 53,44% of the subjects said that one session per week in not enough for learning English, 21,47% of the subjects suggest adding more sessions of English to their schedule to make the course useful. In fact, this is an important point that we hope the administration will take into consideration.

For the students’ level in English, it is described by 68,96% of the respondents as low and very low. Interestingly, although they spent 06 years in learning English, none of them said that they have good level in English. As far as reading is concerned,

74,13% of the students admit that their reading level in English is poor as their understanding of what they read is limited to few words and some phrases. In fact, only 8, 62% students said they easily read in English; whereas 79,3% stated they regularly have difficulties while reading. In fact, the students' inadequate level in English creates a hurdle in dealing with technical English. In this respect, 87,94% of the respondents are aware that their current level in English which does not help them to advance in learning English of electronics. At this level, a GE vs. EST dilemma appears in teaching English to cope with the learners' needs, wants, and lacks. For that, subjects are in a dire need for improving their basics in General English and experience the specialised language at the same time.

5.1.2.2. Students' Needs and Preferences in Learning English

It is clear from the subjects' responses to question 06 that their needs and wants for English are purely academic (Table 14). To precise, the participants listed "reading documents" (18,72%), "writing scientific reports" (16,59%), and " passing exams" (15,31%) as their main purposes in learning English followed by "getting a job" (16,59%). Moreover, they demonstrated their awareness of the importance of "get and produce" about their field of speciality. This explains students' desire to learn English which helps for their academic success. In students' opinion vis-a vis their level in English, 58, 62% of the respondents (N= 58) believe that they are in a dire need for having both technical and general English.

Above all, when they are asked about the content of the English course they need (Table 16), 18,03% of the respondents said they need to have a glossary for the technical words of their discipline Electronics, 8,19% need to have structure of technical English; 15,84% who asked for general vocabulary; against 12,02% for

grammar. In addition, they expressed their need for having reading comprehension (11,47%) and translation (12,02%). Simply, students state that they require to enrich and improve their linguistic package in GE at the same time learn more about technical English and improve their learning skills; particularly reading comprehension.

As far as learning English is concerned, 42,71% of the subjects show their preference in learning through reading(Table 17). In the same vein, learners believe that reading is the most important skill, followed with listening, speaking and writing; receptive skills ranked first then receptive next (Table 18).

Reading is proved to be very important for our subjects as 94,82% (Table 19) of them said they read in English and half of the subjects stated that they practice the act of reading regularly. For their reading needs (Table 22), students said they mainly read all documents (28,22%) about Electronics (28,16%) and science in general (15, 49%), texts of exams (28,22%) and articles on internet (24, 19%). All their readings are, in fact, for gaining information and improving their in English in the first place (Table 23).

Taking their needs into account, the respondents think that the courses given by teachers do not fully satisfy their needs in learning English; 44,82% (Table 13) of them believe that the courses do partly help in learning English. For that, it is important to encourage the idea of teaching what learners need, want, and lack to fuel their motivation.

5.1.2.3.Students' Deficiencies

The students' limited contact with reading in English is a clear sign of their poor reading performance (Table 25). Students' deficiencies and difficulties are at different levels (Table 27); understanding words (37.75%), understanding general idea (9.12%), understanding supporting details (16.32%) and understanding the relationship between

ideas (18.36%). The main causes of students' problems (Table 28) with comprehension are the unknown words (36.23%) and grammatical structures (20.80%), the organisation of information and link between sentences (12.75%). For vocabulary (Table 29), technical vocabulary (43.47%) and semi-technical vocabulary (39.13%) do create significant problems to subjects.

5.1.2.4.Students' Suggestions for Improving Teaching English

Students' suggestions (Table 30) can be grouped as follows: course suggestions and organisational (administrative) suggestions. The former suggestions are about having subject-specific materials, giving more importance to reading (18.12%), speaking skill (7.38%) and writing skill (2.01%), giving more importance to grammar (12.75%), and encouraging collaborative work (2.01%); whereas the latter suggestions are about having more sessions of English per week (21.47%), having English courses in all semesters, integrating technology in teaching (2.01%), using Arabic and French in explaining (11.40%) implement preparatory courses for low level students and advanced courses for good level students. To sum up, the data obtained from the questionnaire helped us in drawing the following conclusions:

- Students' responses revealed not only the importance of the English language but also the significant role of reading in their field of speciality for their academic success.
- Moreover, the findings proved that our students are aware of their needs and lacks in English. This is clearly seen in their choice of the elements of the English course in terms of activities (Table 16), type of language (Table 15) and their dissatisfaction of what they get from the English course (Table 13).
- Next, their needs are related to both general and technical English with focus on the reading skill. Actually, the subjects expressed their dire need for mastering reading

(Table 18) as a means of getting information and improving their level in English, thus passing exams (Table 14). Furthermore, the findings highlighted a crucial point about students' lacks of the basics in English.

- The respondents' answers also revealed the students' poor level (Table 10) even though they had experience with English in middle school, high school, and graduation. This can be explained by the fact that the majority of students seem to study English just for getting a "pass mark" ultimately they end up every stage of learning with little information in memory.
- As a result, our participants cannot function effectively in the target language because of the gap that exists between their linguistic package and what they are supposed to have learnt at this level.
- Thus, a GE/ EST debate emerges; students' do not have the appropriate level on the one hand, and they need more specialised technical language on the other hand to meet their needs. In this respect, our study is a suggestion to create a balance between GE and EST courses.
- Add to this the fact that the use of English is very restricted to classroom. English is a compulsory module that taught with rate of one session per week which does not really cope with their motivation
- Finally the students' answers allow us to have a clear image of the teaching and the learning of English for Electronics students. In addition, the findings revealed the need for setting up reading courses with a clear focus on language that favours a combination between general and specific courses related to the discipline, electronics of with a strong emphasis on reading.

5.2. The Tests Results

5.2.1. The Linguistic Test

The global and partial scores of the Entry Tests (linguistic tests) of both experimental and control groups are recorded in Tables 31 and 32 below.

Table 31
Scores of the Experimental Group in Entry Test 1 and Entry Test 2

N	Entry Test 01				Entry Test 02				Average
	G . S	R .F	Voc.	Av	G . S	R .F	Voc.	Av	
1	3	0	1	4	1	2	3	6	5
2	4	0	2	6	0	1	2	3	4,5
3	4	3	3	10	1	6	4	11	10,5
4	0	4,5	1	5,5	0	0	2	2	3,75
5	3	4,5	3	10,5	0	1	4	5	7,75
6	2,5	1,5	2	6	0	2	3	5	5,5
7	3	0	3	6	0	4	1	5	5,5
8	3	3	2	8	1	4	3	8	8
9	3,5	4,5	4	12	1,5	4,5	4	10	11
10	1	1	3	5	0	4,5	4	8,5	6,75
11	3,5	1	2	6,5	2,5	4,5	2	9	7,75
12	3	0	5	8	0	2	2	4	6
13	3,5	3	3	9,5	2	4,5	4	10,5	10
14	2	4,5	1	7,5	2	3	2	7	7,25
15	3,5	4	3	10,5	0	3	4	7	8,75
16	2,5	1,5	3	7	0	2	4	6	6,5
17	3	1,5	3	7,5	1,5	4,5	3	9	8,25
18	4	7,5	4	15,5	1	5	4	10	12,75
19	3,5	1,5	2	7	1	4,5	4	9,5	8,25
20	0	1,5	1	2,5	1	0	2	3	2,75
21	2	1,5	1	4,5	0	0	3	3	3,75
22	3	1,5	4	8,5	2	6	2	10	9,25
23	3	6	5	14	1	5	5	11	12,5
24	1	4,5	5	10,5	2	3	3	8	9,25
25	1,5	1,5	2	5	0	5	3	8	6,5
26	3	6	3	12	2	6	4	12	12
27	2	4,5	3	9,5	0	4	2	6	7,75
28	3	3	2	8	2	6	4	12	10
29	3,5	9	5	17,5	2	6	5	13	15,25
TOTAL	77,5	85,5	81	244	26,5	103	92	221,5	232,75
Mean	2,67	2,94	2,79	8,41	0,91	3,55	3,17	7,63	8,02

N: Number of Students.
G.S: Grammatical Structures.
R.F: Rhetorical Functions.
Voc: Vocabulary.
Av: Average.

Table 32
Scores of the Control Group in Entry Test 1 and Entry Test 2

N	Entry Test 01				Entry Test 02				Average
	G.S	R.F	Voc.	Av	G.S	R.F	Voc.	Av	
1	3	1	3	7	2	3	1	6	6,5
2	2,5	0	1	3,5	0	2	0	2	2,75
3	2,5	4,5	5	12	0	6	2	8	10
4	2	0,5	2	4,5	0	3	3	6	5,25
5	3,5	1,5	2	7	1,5	3	3	7,5	7,25
6	3	2	3	8	2,5	1,5	2	6	7
7	4	9	3	16	3	7,5	3	13,5	14,75
8	2,5	3	3	8,5	1	1,5	4	6,5	7,5
9	4	4,5	5	13,5	3	7,5	5	15,5	14,5
10	2,5	0	1	3,5	1	0	1	2	2,75
11	0	0	3	3	1	3	1	5	4
12	1,5	0	0	1,5	0,5	0	2	2,5	2
13	3	2	2	7	0	4,5	3	7,5	7,25
14	3,5	4,5	3	11	2,5	3	3	8,5	9,75
15	3,5	3,5	3	10	0	3	4	7	8,5
16	2,5	4,5	3	10	1	6	4	11	10,5
17	2,5	3	5	10,5	2	3	3	8	9,25
18	2	2	3	7	0	3	3	6	6,5
19	4	4	3	11	1	6	3	10	10,5
20	3	3	5	11	0	5	4	9	10
21	4,5	2,5	5	13	0	1	3	4	8,5
22	3	0	4	7	2,5	3	4	9,5	8,25
23	4	2,5	1	7,5	0	2	3	5	6,25
24	2,5	3,5	5	12	2,5	6	4	12,5	12,25
25	2	1,5	1	4,5	0,5	4,5	2	7	5,75
26	3	0,5	2	5,5	0	1	3	4	4,75
27	3,5	4	4	11,5	3	4,5	5	12,5	12
28	3,5	0	3	6,5	0	2	3	5	5,75
29	3	6	2	11	2	3	3	8	9,5
TOTAL	85	74	85	244	32,5	98,5	84	215	229,5
Mean	2,93	2,55	2,93	8,41	1,12	3,39	2,89	7,41	7,91

N: Number of Students.
G.S: Grammatical Structures.
R.F: Rhetorical Functions.
Voc: Vocabulary.
Av: Average.

A consideration of figure 14 below which represent the students' scores in Entry Test 01 and Entry Test 02, offers a clear viewpoint of students' distribution of scores. Students' scores range from 02 to 17,5. Obviously, most of the students' scores are between 06 -10 . For the lowest scores recorded in the experimental group in Entry test 01and Entry test 02 are 02 and 02,5 respectively. In addition, 17,5 and 15,25 are the highest scores respectively recorded Entry Test 01and Entry Test 02.

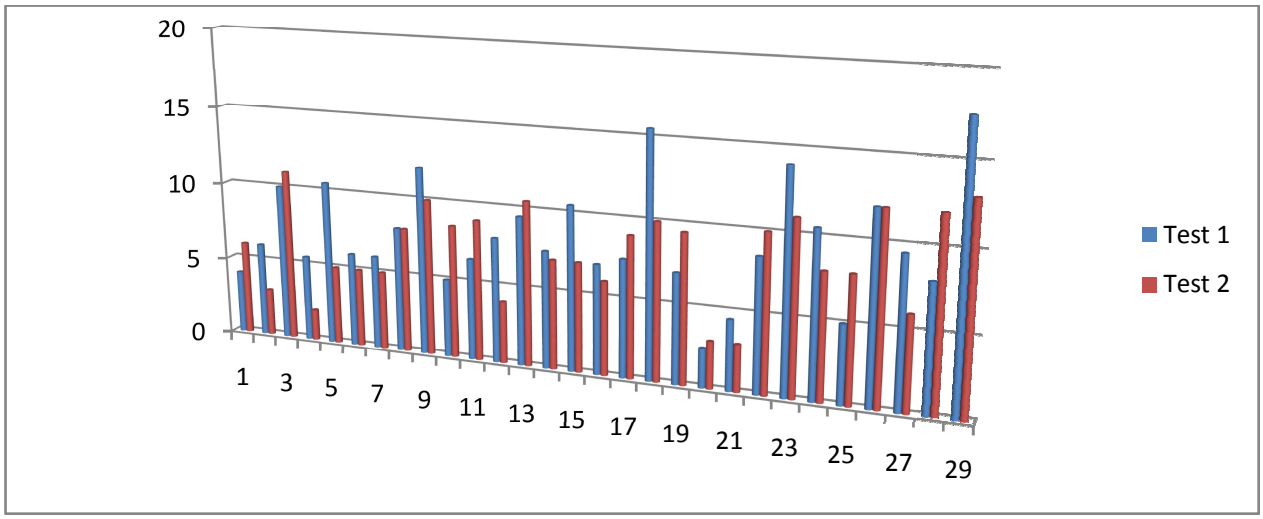

Figure 14 . Scores of the Entry Test 1 and Entry Test 2 of the experimental group

The distribution of students' scores in the control group is presented in Figure 15. Students' scores in Entry Test 01 and Entry Test 02 range from 1,5 to 16. Clearly demonstrated in this graph, most of the students' scores are between 04 – 12, 16 and 1,5 are the highest and lowest scores, respectively-recorded in Entry Test 1 and Entry Test 2. On the other hand, the highest and lowest scores in Entry Test 1 and Entry Test 2 are 15, 5 and 02, respectively.

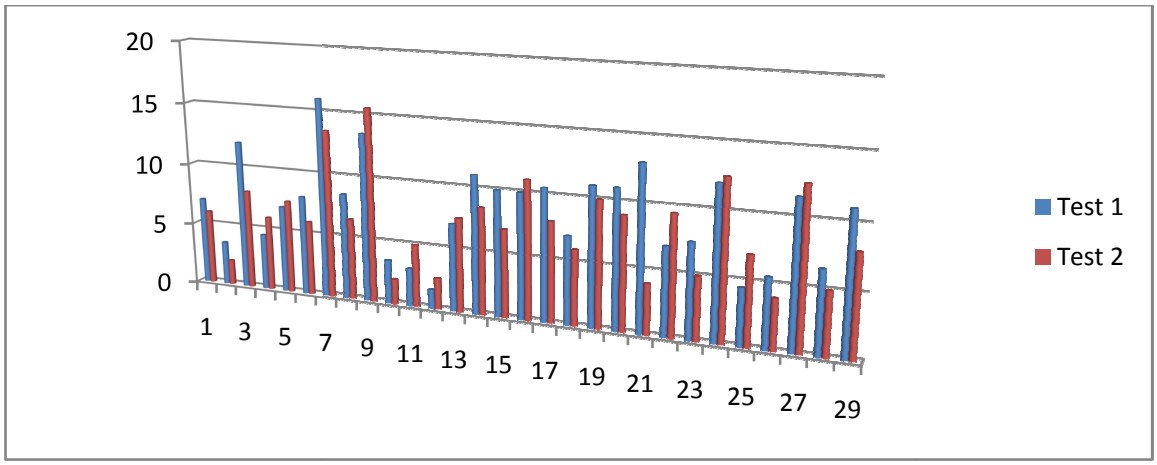

Figure 15. Scores of the Entry Test 1 and Entry Test 2 of the control group

The subjects' scores displayed in Tables 31 and Table 32 are grouped into above average scores, average scores and below average scores and they are presented in Tables 33 and 34.

Table 33
Summary of Scores of the Entry Test 1 and Entry Test 2 of the Experimental Group

Scores	**Entry Test 01**		**Entry Test 02**	
	N	**%**	**N**	**%**
above average	08	27,58%	05	17,24%
average	01	3,45%	03	10,34%
below average	20	68.96%	21	72.41%
Total	29	100%	29	100%

For the experimental group, 31,03 % of the total respondents (N= 29) got average and above average scores; whereas 68,96 % got below average scores in Entry Test 01. In Entry Test 02, similarly, only, 27,58% got average and above average scores; 21 students (72,41%) got below average scores.

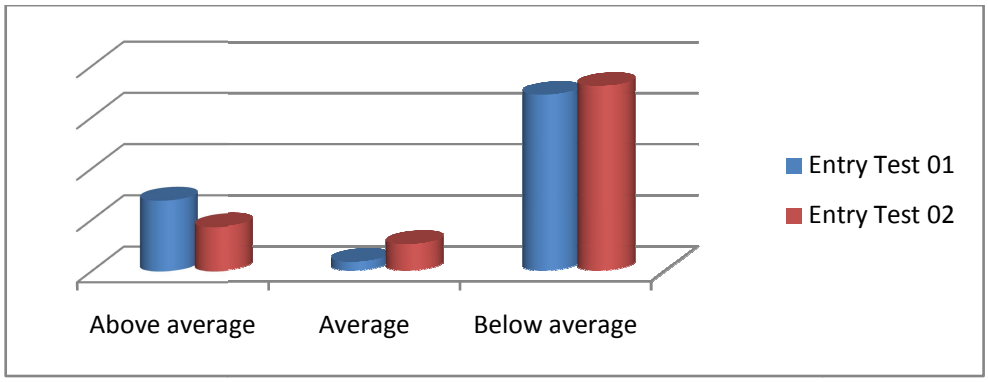

Figure16. Summary of scores of the Entry Test 1 and Entry Test 2 of the experimental group

It is interesting to note in the graph above (figure 16) that the number of students who got above average scores decreased in Entry Test 02; against the number of those who got average scores which increased. Besides, the number of students who got below average scores is very close. In general, students' performed better in Test 01 than in Test 2. Yet in both tests, the students' performance reflects their poor level in English.

Table 34
Summary of Scores of the Entry Test 1 and Entry Test 2 of the Control Group

Scores	**Entry Test 01**		**Entry Test 02**	
	N	**%**	**N**	**%**
Above average	11	37, 93	05	17,24
Average	02	6,89	01	3,44
Below average	16	55,17	23	79,31
Total	29	100	29	100

In Entry Test 1, 44,82% of the total respondents of the control group (N=29) had an average and above average scores, whereas 55,17% got below average scores. In contrast, 20,68% got average and above average scores; whereas 23 students (79,31%) got below average scores in Entry Test 2.

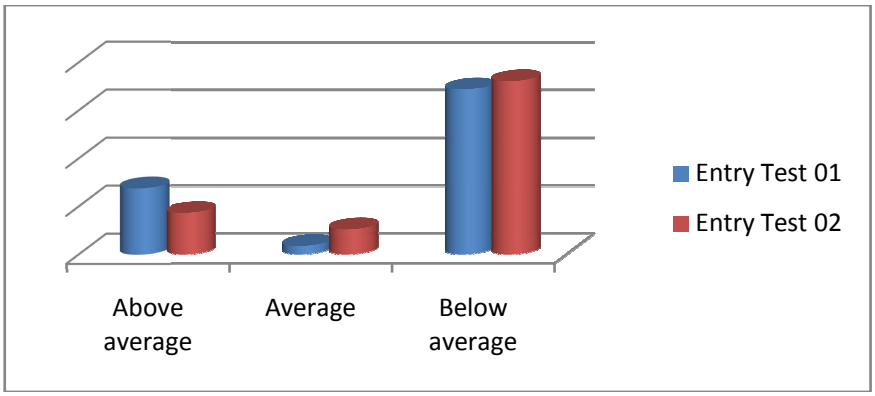

Figure 17. Summary of scores of the Entry test 1 and Entry test 2 of the control group

From this graph, we notice that the majority of students scored better in Test 01 than in Test 2. To precise, the number of students who got average scores increased in Entry Test 02; against the number of those who got above average scores which has decreased. In addition, the number of students who got below average scores is very close.

Comparing the scores of the experimental group to the scores of the control group represented in Figure 18, we notice that in both tests and for both groups, the highest percentage of answers goes to the 'below average scores' followed by the 'average scores' and 'above average scores' is last. This indicates the students' poor knowledge in English.

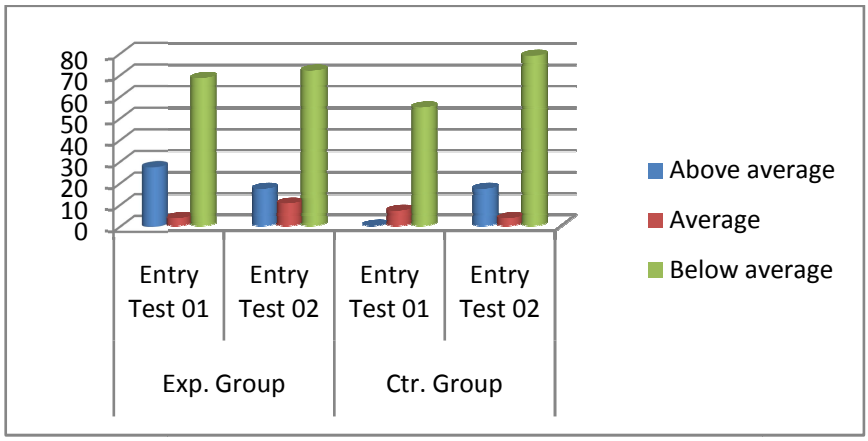

Figure 18. A comparison of students' scores of the experimental and the control Group

Table 35
Summary of Results of the Experimental and the Control Group in the Two Entry Tests

Descriptive statistics	Exp. Group			Ctrl. Group			The difference between the Exp. Group and the Ctrl. Group		
	Test 01	Test 02	Average	Test 01	Test 02	Average	Test 01	Test 02	Average
Sum of Scores	244	221,5	232,75	244	215	229,5	00	6,5	3,25
Mean	8,41	7,63	8,02	8,41	7,41	7,91	00	0,22	0.11

Table 35 offers an overall view on the subjects' linguistic knowledge from both experimental and control group. The findings reveal that the sum of students' scores of test 01 is the same (244-244) for both groups. In Entry Test 2, their scores are nearly equal (221,5 – 215) where the experimental group scored slightly higher than the control group with a 0,22 difference in the mean. ¨

In general, both groups had more or less the same performance in both tests, as the difference in means of their averages indicates (0,11).

Both groups performed better in Test 01 than Test 02 which is explained by the fact that the more we probe the students' knowledge, the more we discover that it is very poor. These results confirm that students in both groups have a poor level in English. In the following section, we will present an analysis of the results of every aspect tested.

Table 36
Summary of Students' Results in the Three Activities

	Entry Test 01		**Entry Test 02**	
	Exp. Group	**Ctrl. Group**	**Exp. Group**	**Ctrl.**
grammatical structures	31,76%	34,42%	11,96%	15,11%
	77,5	84	26,5	32,5
rhetorical functions	35,04%	30,32%	46,5%	45,81%
	85,5	74	103	98,5
vocabulary	33,19%	34,83%	41,53%	39,06%
	81	85	92	84
Total	100%	100%	100 %	100 %
	244	244	221,5	215

As it can be read from these table that students' scores are almost equally disturbed among the three activities in Test 1 for both groups ; 31,76% – 35,04% – 33,19% for the experimental group and 34,42%- 30,32% – 34,83% for the control group. Interestingly, the distribution of scores is different in Test 02, yet similar for both groups; vocabulary is ranked first with 41,53% for the experimental group and 39,06% for the control group, then rhetorical function second with 46,50% for the experimental group and 45,81% for the control group and grammatical structures last with 11,96% for the Exp. Group and 15,11% for the Ctrl. group. To end up, both groups showed a poor performance in three activities in the two tests.

5.2.2. Comprehension Tests: The Observation Grid

Students' performance in the four comprehension tests is recorded in Tables A1, A2, A3, A4 (See Appendix 11). Every table summarises the students' scores in the five activities: dichotomous questions, multiple choice questions, guessing meaning, information transfer, filling the gaps, and their average. In every table, sum of scores and the mean are calculated. Below, a summary of the results of students' scores in the four tests is presented.

The performance of students in both experimental and control group is recorded in Table 37 below. This table summarises the students' scores in the four comprehension tests; pre-test, post-test 1(Exit Test 1), post-test 2 (Exit Test 2), post-test 3. It includes the summary of the scores in each test and the calculated mean of each group.

Table 37
Students' Results in the Four Comprehension Tests

N°	Experimental group					N°	Control group				
	Pre-test	Post-test 1	Post-test 2	Post-test 3	Post-test Average		Pre-test	Post-test 1	Post-test 2	Post-test 3	Post-test Average
1	8,5	10,5	6	9	8,5	**1**	9,5	10	7	9	8,66
2	6	7,5	11	11,5	10	**2**	6	9	9	8	8,66
3	9,5	11,5	13,5	11	12	**3**	12,5	10	10,5	10	10,16
4	3	4	5	7	5,33	**4**	9,5	8,5	6	7	7,16
5	8	7,5	12	10,5	10	**5**	6	7,5	6,5	9	7,66
6	8	11	9	13	11	**6**	8,5	8,5	7,5	7	7,66
7	9	10	13,5	11	11,5	**7**	16,5	18,5	15,5	19	17,33
8	8	14	9,5	9,5	11	**8**	6,5	7,5	8	8,5	8
9	8,5	8,5	16,5	12	12,33	**9**	14,5	14,5	13,5	15	14,33
10	6	9,5	13	14,5	12,33	**10**	2	3	3,5	7	4,5
11	7,5	10,5	14	10,5	11,66	**11**	5,5	4	6,5	6,5	5,66
12	7	9	14	11,5	11,5	**12**	1,5	3,5	4	3,5	3,66
13	14,5	12,5	13,5	15	13,66	**13**	6,5	7	7,5	6	6,83
14	8	10,5	10,5	7,5	9,5	**14**	12	12	14	14	13, 33
15	8,5	7,5	6,5	12,5	8,83	**15**	6	9	7	7	7,66
16	7	6	10	10,5	8,83	**16**	12	7,5	9,5	9	8,66
17	8	7	10,5	11,5	9,66	**17**	7,5	8,5	6,5	6	7
18	13,5	12,5	15,5	13,5	13,83	**18**	6,5	10,5	10	9	9,83
19	8	9	10	8	9	**19**	10,5	9	7,5	8,5	8,33
20	4	3	3	6,5	4,16	**20**	11,5	11,5	9	11	10,5
21	4	4	5	9,5	6,16	**21**	7,5	8	9	7,5	8,16
22	11,5	8	10	13	10, 33	**22**	10,5	11	11,5	5	9,16
23	13	11	12	12,5	11,83	**23**	6,5	5	5	7	5,66
24	10	14	8,5	11	11,16	**24**	10	8	7	11	8,66
25	6,5	10	11,5	11,5	11	**25**	6	8	9	10	9
26	12,5	14,5	13	15	14,16	**26**	8,5	7	8,5	8	7,83
27	6	12,5	12,5	6,5	10,5	**27**	13,5	9	12,5	13	11,5
28	7	9	10,5	8,5	9,33	**28**	8,5	7,5	10,5	7,5	8,5
29	16	16	17	15	16	**29**	8,5	8	10,5	8,5	9
∑X	247	280,5	316,5	318,5	305,16	**∑X**	250,5	251	252	257,5	253, 33
$\bar{x}$ **E**	8,51	9,67	10,91	10,98	10,52	$\bar{x}$ **C**	8,63	8,65	8,68	8,87	8,74

5.2.2.1. The Pre-test

Table 38
Summary of Scores of the Experimental and the Control Group in the Pre-test

	Exp. Group	Ctrl. Group
above average	06	09
	20.69	31.03%
average	01	01
	3.44%	3.44%
below average	22	19
	75.87%	65.52%
Total	29	29
	100%	100%

As indicated in the table above, 24,13 % obtained average and above average scores; whereas 75.87 % got below average scores. Students' scores range from 03 to 16 the lowest and highest scores respectively recorded. On the other hand, 32.47% got average and above average scores; whereas 65.52% got below average scores. 16,5 and 1,5 are the highest and lowest scores recorded, respectively.

5.2.2.2. The Post-tests

Table 39
Summary of Scores of the Experimental and the Control Group in the Post-test 01

	Exp. Group	Ctrl. Group
above average	13	06
	44,83%	20,67%
average	02	02
	6,90%	6,90%
below average	14	21
	48,27%	72,41%
Total	29	29
	100%	100%

A look at the above table reveals that almost half of the respondents 51,73 % got average and above average, while the second part 48,27% below average scores. In this test, the lowest and highest scores recorded are 03 and 16 respectively. For the control group, the majority 72,41% got below average scores and only 20,67% got average and above average scores. Students' scores range from 03 to 18,5.

Table 40
Summary of Scores of the Experimental and the Control Group in Post-test 02

Scores	**Exp. Group**		**Ctrl. Group**	
	N	**%**	**N**	**%**
Above average	18	62,07	08	27,59
Average	03	10,34	01	3,44
Below average	08	27,59	20	68,97
Total	29	100	29	100

The results summarised in this table show that the majority of respondents (72,41%), in the experimental group, scored average and above average the second part 14 students (48,27%) below average scores. The lowest and highest scores recorded in this test are 03 and 17 respectively. For the control group, only 31,03% had an average and above average scores the majority 68,97% got below average scores and. Students' scores range from 03,5 to 15,5.

Table 41
Summary of Scores of the Experimental and the Control Group in Post-test 03

Scores	**Exp. Group**		**Ctrl. Group**	
	N	**%**	**N**	**%**
Above average	20	68,97	06	20,69
Average	00	00	02	6,90
Below average	09	31,03	21	72,41
Total	29	100	29	100

Of the total respondents of the experimental group (N= 29), 68,97% got above average, and 48,27% got below average scores. The lowest and highest scores recorded in this test are 6,5 and 16 respectively. For the control group, 27,59% of the subjects (N=29) got average and above average scores the majority of students (72,41%) had below average scores and. Students' scores range from 03,5 to 19.

5.2.2.3. Computation of Correlation Coefficient Test

To determine that there is any relation between students' linguistic knowledge and their reading comprehension we have used the correlation coefficient test predicting that there a positive relation between the variables. To calculate the "r", we have used the following formula:

$$r(xy) = \frac{\sum xy}{(\mathrm{N})(\mathrm{SD}x)(\mathrm{SD}y)}$$

$\sum$ ⟶ the Sum

x= (X – Mx) → the deviation of x scores from the mean (Mx is the mean of x scores: the sum of x scores divided by the number of cases N)

y= (Y- My) → the deviation of y scores from the mean (My is the mean of y scores: the sum of y scores divided by the number of cases N)

xy→ the cross-products (multiplication of x and y deviations).

N → the number of cases.

Standard deviation of X scores: SDx= $\sqrt{\frac{\sum x2}{N}}$

Standard deviation of Y scores SDy= $\sqrt{\frac{\sum y2}{N}}$

Table C1 and C2 (See Appendix 12) represent all needed calculation mentioned above x, y, N, SDx, SDy and xy for the "r" for both groups experimental and control

where X represents students' scores obtained in the Entry tests and Y represents their scores in the reading comprehension (pre-test). The table below represents a summary of the results obtained along with the average of the whole sample.

Table 42
Summary of Calculation for Coefficient Test

Statistics	Exp. Group	Ctrl. Group	Average
SDx	8,50	10,16	9,33
SDy	9,26	11,36	10,31
r(xy)	0,96	0,67	0,81

In this one tailed test (directional test), we have determined the alpha level at 0.05 ($\propto = 0.05$) and with 54 degrees of freedom, the critical value of r is 0.21. Since the value of the r obtained is 0.81 (as indicated in Table 42 above), we can say that the null hypothesis (H0: robs $\leq$ rcrit) that assumes no relationship between the variables is rejected. Furthermore, the r obtained r = 0.81 is much higher than the critical value r = 0.21(H_1: robt > robs) which means that our hypothesis is accepted and the correlation coefficient between the two variables is very significant. In other words, the results revealed that there is a positive correlation between students' knowledge of language and reading comprehension. The following scatter graphs represent the results clearly:

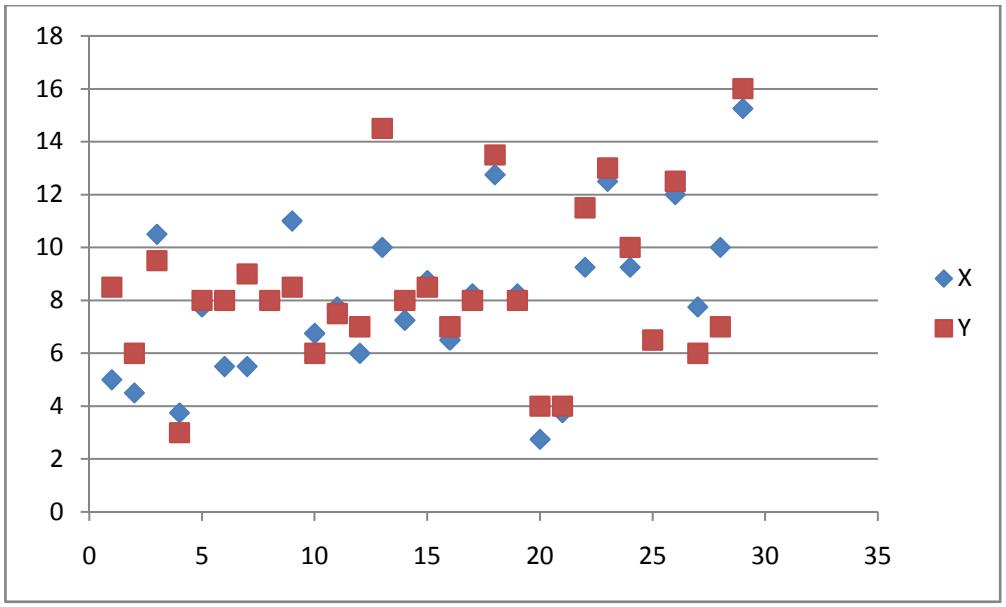

Figure 19. Correlation between students' language knowledge and reading comprehension for the experimental group

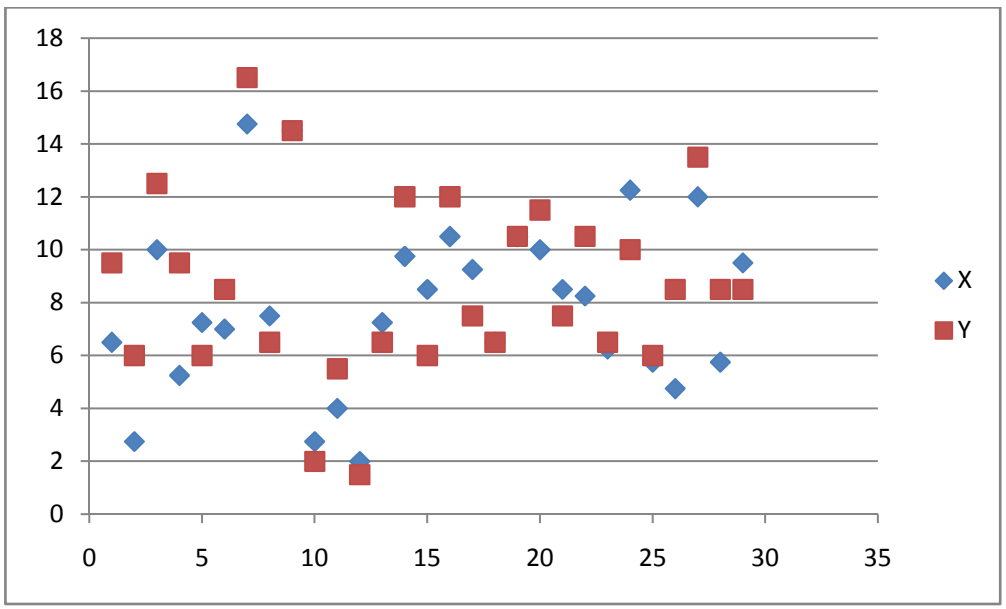

Figure 20. Correlation between students' language knowledge and reading comprehension for the control group

These diagrams indicate how close or far the scores of every student in the linguistic test (horizontal axis) and reading comprehension (vertical axis) in both groups. As it is displayed in Figures 19 and 20., the distribution of points, that represent the students' scores, indicates the positive correlation between the variables as they nearly occupy the same position (high language knowledge → high reading

comprehension and low language knowledge → low reading comprehension) for most students with few exceptions. Most of test-takers respondents have almost equal scores in the linguistic test they have more or less approximate scores in the reading comprehension.

5.2.2.4. Analysis of the Four Comprehension Tests

Table 43
Difference in Means in the Pre-test

Pre-test	Experimental group	Control group
Sum of scores	247	250,5
Average	8,51	8,63
Difference in mean	0,02	

The table above summarises the students' results in the pre-test which indicate that both groups do have very close sum scores (247 Vs. 250, 5) with 0,02 difference in the means. Apart from that, we can say that both groups do have more or less the same proficiency level. In other words, any other difference in their scores will directly be linked to the implementation.

Table 44
Difference in the Means of the Post-test 01

Post-test	Experimental group	Control group
Sum of scores	280,5	251
Average	9,67	8,65
Difference in mean	1,02	

According to the results recorded in this table, there is difference in sum of scores (280,5 Vs. 251) which can be easily noted in the difference in the means 1,02. This can be explained by the fact that some learners have enhanced their performance compared with the earlier test.

Table 45
Difference in the Means of the Post-test 02

Post-test	Experimental group	Control group
Sum of scores	316,5	252
Average	10,91	8,68
Difference in mean	2,23	

The results in the above table reveal that the experimental group scored higher than the control group (316,5 Vs. 252) and a significant difference in the means 2,23. This continuous improvement in performance is a result of the research treatment.

Table 46
Difference in the Means of the Post-test 03

Post-test	Experimental group	Control group
Sum of scores	318,5	257
Average	10, 98	8,87
Difference in mean	2,11	

The findings displayed in Table 46 indicate the better performance of the experimental group which can be noticed in the difference in the sum of scores (318,5 Vs. 257) and in means 2,11.

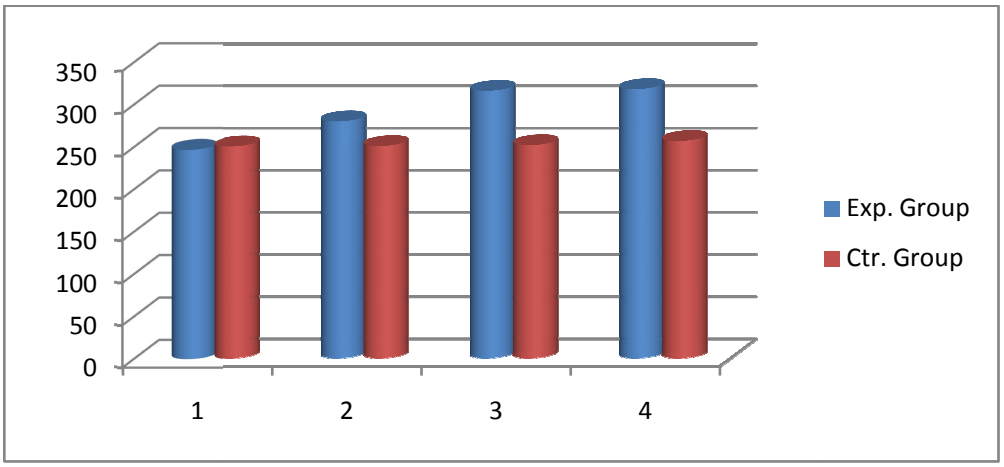

Figure 21. Summary of the tests' results.

Figure 21 enables us to state that both groups are relatively different with respect to their performance in the four comprehension tests. It is clearly seen that the experimental group enhanced his comprehension outcome from one test to another while the control group performance is almost constant.

5.2.2.4.1. Analysis of Tests' Activities

Table 47
Scores of Both Groups in the Five Activities over of the Four Tests

Activities	Pre-test		Post-test 1		Post-test 2		Post-test 3	
	Exp. Group	Ctrl. Group	EXP Group	Ctrl. Group	Exp. Group	Ctrl. Group	Exp. Group	Ctrl. Group
Dichotomous	49	61,5	49,5	57	54,5	47	59	51
M.C.Q	67,5	57	76	57	62	55	66	59
Meaning Guessing	68	50	69	57	74	59	76	62
Information Transfer	39,5	46,5	51,5	45	71	49,5	63,5	49
Gap-filling	23	35,5	34,5	35	55	41,5	54	36,5

As it can be read from the table above, the experimental group has made a continuous progress in the following activities: dichotomous, meaning guessing, and filling the gaps (Figure 22). For the remaining, students' performance varied in multiple choice questions over the four tests and was inconstant in the fourth activity information transfer. While the control group recorded a continuous progress only in activity three GUS (Figure 23). For the rest of the activities, students' performance was irregular over the four tests. In fact, the global performance of experimental group students' in the two last tests is nearly the same (Figure 22) and that of the control group is not significantly different over the four tests (Figure 23).

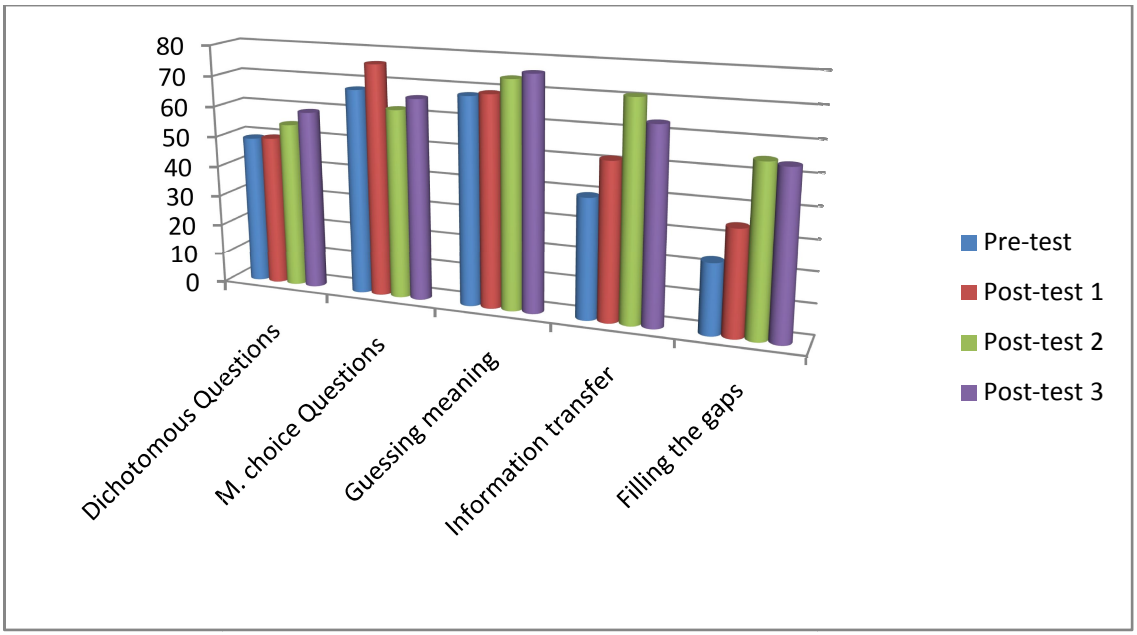

Figure 22. Scores of experimental group in the five activities over the four tests

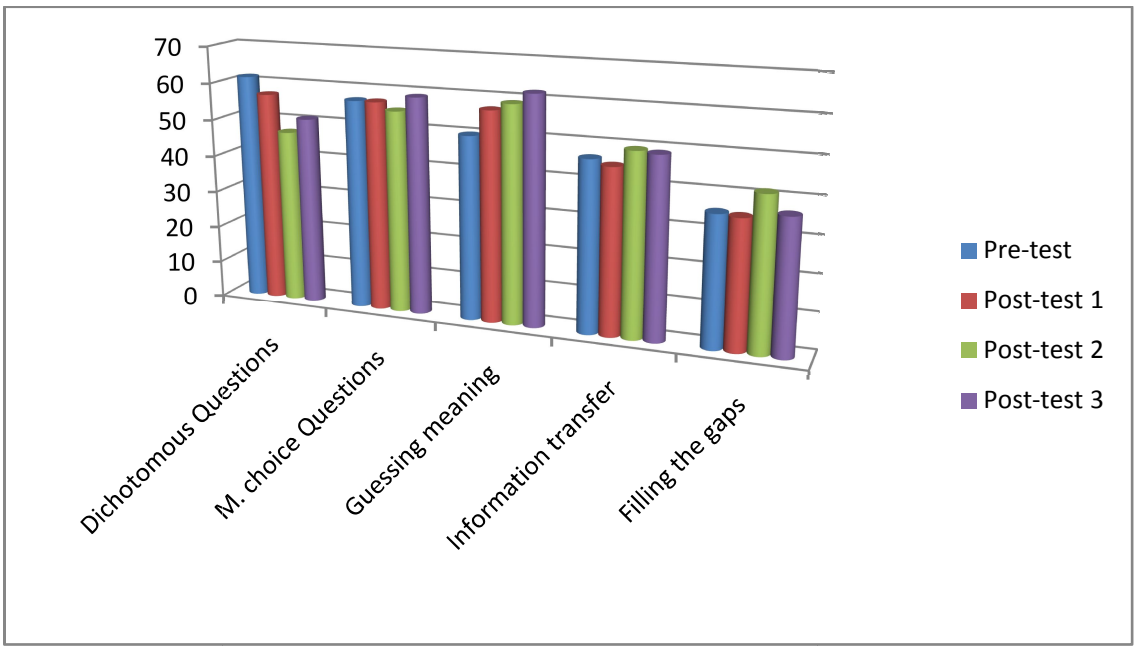

Figure23. Scores of control group in the five activities over the four tests

5.2.2.4.1.1. Activity One: Dichotomous Questions

Table 48
Comparison between Both Groups Scores in Activity One

Tests	Experimental Group		Control Group		Difference in Means
	Sum /	Mean	Sum/	Mean	
Pre-test	49	1,68	61,5	2,12	- 0,44
Post-test 01	49,5	1, 70	57	1,96	- 0,26
Post-test 02	54,5	1, 87	47	1,62	0,25
Post-test 03	59	2, 03	51	1, 75	0,28

The experimental group showed a progress over the four tests unlike the control group. The highest scores were in the post-test 03 (59) for the experimental group, and conversely in the pre-test (61,5) for control group. In the first two tests, the control group performed better than the experimental. By contrast, in the last two tests the experimental group performed better.

5.2.2.4.1. 2.Activity Two: Multiple-choice Questions

Table 49
Comparison between Both Groups' Scores in Activity Two

Tests	Experimental Group		Control Group		Difference in the Means
	Sum	Mean	Sum	Mean	
Pre-test	67, 5	2,32	57	1,96	0,36
Post-test 01	76	2,62	57	1,96	0,65
Post-test 02	62	2,13	55	1,89	0,24
Post-test 03	66	2,27	59	2,03	0,24

By comparing the mean scores in activity two of the two groups in the four tests, we can see that the experimental group performed better than the control group. Interestingly, the scores of both groups show a modest progress in performance. The

highest scores were recorded in post-test 01 (76) for the experimental group and in post-test 03 (59) for the control group.

5.2.2.4.1. 3.Activity Three: Guessing Meaning

Table 50
Comparison between Both Groups' Scores in Activity Three

Tests	Experimental Group		Control Group		Difference in the Means
	Sum	Mean	Sum	Mean	
Pre-test	68	2,34	50	1,72	0,62
Post-test 01	69	2,55	57	1,96	0,59
Post-test 02	74	2,62	59	2,03	0,59
Post-test 03	76	2,51	62	2,13	0,38

In activity four, both groups made a progress in their performance; the experimental group made a significant improvement as their scores indicated however the improvement of the control group is insignificant. Both groups recorded their highest scores in post-test 03.

5.2.2.4.1. 4.Activity Four: Information Transfer

Table 51
Comparison between Both Groups Scores in Activity Four

Tests	Experimental Group		Control Group		Difference in the Means
	Sum	Mean	Sum	Mean	
Pre-test	39,5	1,36	46,5	1,60	-0,24
Post-test	51,5	1,77	45	1,55	0,22
Post-test	71	2,44	49,5	1,70	0,74
Post-test	63,5	2,18	49	1,68	0,5

Table 51 clearly indicates that the experimental group did well in the four tests and marked a sound improvement in scores, for the control group scored better than the control group only in the pre-test. The highest scores of both groups are in post-test 03.

5.2.2.4.1. 5.Activity Five: Gap- filling

Table 52
Comparison between Both Groups' Scores in Activity Five

Tests	Experimental Group		Control Group		Difference in the Means
	Sum	Mean	Sum	Mean	
Pre-test	23	0,79	35,5	1,22	-0,43
Post-test 01	34,5	1,18	35	1,20	-0,02
Post-test 02	55	1,89	41,5	1,43	0,46
Post-test 03	54	1,86	36,5	1,25	0,61

As far as activity five is concerned, scores of the experimental group increased over the four tests unlike the control. In the first two tests, the experimental group scored lower than control group contrary to the last two tests. Again, the highest scores are recorded in post-test 03 with 55 for the experimental and 41,5 for the control group.

5.2.2.4.2. Analysis of the Post-tests (average)

The mean of the subjects' (the experimental group and control group) scores in the three post-tests in the five activities in calculated and summarised in Table 53 below.

Table 53
Experimental and Control Groups' Means of the Three Post-tests

N°	Experimental Group						N°	Control Group					
	Dic	MC	GUS	IT	GF	AV/20		Dic	MC	GUS	IT	GF	AV/20
01	2	3	2	1	0,5	8,5	01	2	2	1	2	1,66	8,66
02	1,83	2,66	2,66	1,33	1,5	10	02	2,16	3	1,66	0,83	1	8,66
03	2	2,66	3	3	1,33	12	03	1,83	1,66	2,66	2	2	10,16
04	1,16	1,33	1,33	0,83	0,66	5,33	04	2	1,3	1,33	1,16	1,33	7,16
05	1,66	2	3	1,16	2,16	10	05	1,5	1,33	2,33	1,16	1,33	7,66
06	2,33	2	3	2,16	1,5	11	06	1,66	1,66	1,66	1,83	0,83	7,66
07	1,83	2,33	2,33	3,5	1,5	11,5	07	2,33	3,66	4,33	4,16	3,16	17,66
08	1,83	2	2,66	2,5	2	11	08	1,83	2	1,66	1,16	1,33	8
09	2,5	2,66	2,66	2	2,5	12,33	09	2,5	3	3,33	2,83	2,66	14,33
10	2,33	2,33	2,66	3	2	12,33	10	1,16	1,33	0,66	0,83	0,5	4,5
11	2,16	3	1,66	3	1,83	11,66	11	1,5	1	1,66	1	0,5	5,66
12	2,16	2,33	3	2,16	1,83	11,5	12	1,16	1	0,33	0,5	0,66	3,66
13	2,33	2,66	3,66	2,83	2,16	13,66	13	1,83	1,66	1,66	1	0,66	6,83
14	1,83	2,33	1,66	1,33	2,33	9,5	14	2,16	2	3	2,5	3,66	13,33
15	1,83	1,33	3	2	0,66	8,83	15	1,33	1,33	2,33	1,33	1,33	7,66
16	1,33	2,33	3	0,83	1,33	8,83	16	1,5	2	2,33	2	0,83	8,66
17	1,5	2,66	1,33	2,16	2	9,66	17	1,83	2	0,66	2,5	0	7
18	2,33	3	3,66	3,16	1,66	13,83	18	1,83	2,33	2,66	1,33	1,66	9,83
19	1,833	2	1,66	2,16	1,33	9	19	1,66	2,66	2,66	1	0,33	8,33
20	0,83	1	1	0,83	0,5	4,16	20	2	2,66	2,33	2,16	1,33	10,5
21	1,5	1,33	1,33	1,33	0,66	6,16	21	2,16	2,33	1,66	1,33	0,66	8,16
22	1,66	2	2,66	2	2	10,33	22	1	2,66	2,66	1,66	1,16	9,16
23	1,83	3	2,66	2,33	2	11,83	23	1,66	1	1,33	1	0,66	5,66
24	1,5	2,66	2,66	2,16	2,16	11,16	24	2,16	1,66	2,33	1,83	0,66	8,66
25	1,66	2,66	3	2,33	1,33	11	25	2,33	2	2,33	1,5	0,83	9
26	2,33	2,66	4	2,66	2,5	14,16	26	1,83	2	2,33	0,83	0,83	7,83
27	1,66	3	2	2,33	1,5	10,5	27	1,83	2	2,66	3	2	11,5
28	1,83	2	1,66	2,83	1	9,33	28	1,33	2	2	1,16	2	8,5
29	2,66	3	4	3	3,33	16	29	1,5	1,66	1,66	2,16	2	9
$\sum X_E$	54,33	68	73	62	47,83	305,16	$\sum X_C$	51,66	57	59,33	47,83	37,66	253,48
$\bar{x}_E$	1,87	2,34	2,51	2,13	1,64	10,52	$\bar{x}_C$	1,78	1,96	2,045	1,64	1,29	8,74

N: Number of subjects
$\bar{x}$: Mean
AV: Average
$\sum X$: Sum of scores
GF : Gap- filling

Dic : Dicotomous questions
MC: Multiple choice questions
GUS : Guesssing meaning from context
IT : Information transfer

In what follows, we will proceed in a detailed analysis of the test activities as they appeared in the reading passages.

5.2.2.4.2. 1.Activity One: Dichotomous Questions

Table 54
Students' Performance of the Three Post-tests in Activity One

Scores /04	Post-tests Averages			
	Experimental Group		Control Group	
	N	%	N	%
00- 0,99	01	3,44%	00	00%
01- 1,99	17	58,62%	19	65,51%
02- 2,99	11	37,93%	10	34,48%
03	00	00%	00	00%
Total	29	100%	29	100%

In this activity, the questions asked have two possible answers (true/ false), The answers of students' in both groups are relatively close. No one has answered all the questions correctly in both groups. For the experimental group, the majority of students (96,55 %) had between 01-2,99 against 01 student who had between 00- 0,99. However, all the students in the control group had between 01-2,99.

5. 2.2.4.2. 2.Activity Two: Multiple-choice Questions

Table 55
Students' Performance of the Three Post-tests in Activity Two

Scores /04	Post-tests Averages			
	Experimental Group		Control Group	
	N	%	N	%
00- 0,99	00	00%	00	00%
01- 1,99	04	13,79%	12	41,37%
02- 2,99	19	65,51%	14	48,27%
03-3,99	06	20,68%	03	10,34%
04	00	00%	00	00%
Total	29	100	29	100

Likewise, no student opted for all the appropriate answers to the questions asked. There is a scrutiny in the table above. We notice that the majority of students in both

groups; (65, 51 % for Experimental Group and 48,27 % for the Control Group) scored between 02- 2,99. For the remaining students, 13,79 % of students of the Experimental Group had 01- 1,99; against 41,37% from the Control Group. In addition, the number of students who scored between 03-3,99 from the Experimental Group (20,68%) is higher than of the Control Group (10,34%).

5.2.2.4.2. 3. Activity Three: Guessing Meaning

Table 56
Students' Performance of the Three Post-tests in Activity Three

Scores /04	Post-tests Averages			
	Experimental Group		Control Group	
	N	%	N	%
00- 0,99	00	00	03	10,34
01- 1,99	08	27,58	10	34,48
02- 2,99	10	34,48	13	44,82
03-3,99	09	31,03	2	6,89
04-4,99	02	6,89	1	3,44
05	00	00	00	00
Total	29	100	29	100

Again, the number of students who answered correctly in the three tests is zero for both groups. For both groups, the 62,06% of subjects scored between 01- 2,99; for the Experimental Group and 79,03 % of the Control Group. On the other hand, 37,92% of the students scored between 03-4,99 in the Experimental Group; against 12,33% in the Control Group.

5.2.2.4.2. 4.Activity Four: Information Transfer

Table 57
Students' Performance of the Three Post-tests in Activity Four

Scores /04	Post-tests Averages			
	Experimental Group		Control Group	
	N	%	N	%
00- 0,99	3	10,34	4	13,79
01- 1,99	5	17,24	15	51,72
02- 2,99	15	51,72	8	27,58
03-3,99	6	20,68	1	3,448
04	0	0	1	3,44
Total	29	100	29	100

The results displayed in the table above show that the subjects performed differently in this task. 72,4% of the respondents students from the Experimental Group had scores between 02- 3,99; against 31,02% from the Control Group. Further, only 27,58 % of the students in Exp. Group scored between 00- 1,99; against 65,51 % the Control Group. Furthermore, only one student from the control group who performed well in the task given and scored 04.

5.2.2.4.2. 5. Activity Five: Gap- filling

Table 58
Students' Performance of the Three Post-tests in Activity Five

Scores /04	Post-tests Averages			
	Experimental Group		Control Group	
	N	%	N	%
00- 0,99	05	17,24	13	44,82
01- 1,99	12	41,37	9	31,03
02- 2,99	11	37,93	5	17,24
03-3,99	1	3,448	2	6,89
04	00	00	00	00
Total	29	100	29	100

As far as the last activity is concerned, the number of students who scored high from the Experimental Group is higher than that of the Control Group. For the Experimental Group, 58,61% scored between 00- 1,99 and 41, 37% between 02- 3,99; 75, 85% scored between 00- 1,99, and 24, 13% between 02- 3,99. Finally, none of the students was able to score 04. For the Control group, the majority of the respondents 75,85% scored between 00- 1,99 and 24, 13% between 02- 3,99; and none of the students was able to score 04.

Table 59
Students' Performance of the Three Post-tests in the Five Activities

Activities	Post-tests' Averages					
	Experimental Group			Control Group		
	Scores	Mean	%	Scores	Mean	%
Activity One	54,33	1,87	17,80	51,66	1,78	20,38
Activity Two	68	2,34	22,28	57	1,96	22 ,49
Activity Three	73	2,51	23,92	59,33	2,04	23,41
Activity Four	62	2,13	20,32	47,83	1,64	18,87
Activity Five	47,83	2,13	15,67	37,66	1,29	14,85
Total	305, 16	10,52	100	253,48	8,74	100

The results summarised in the table above represent the scores, mean and the percentage of each activity in the three Post-tests. For the Experimental Group, the highest number of correct answers in activity three is 23,92%. Activity two and four are ranked second and third with 22, 28 % and 20,32 %, respectively. Activity one is ranked next with 17,80% and activity five is last with 15,67%. For The Control Group, similarly, activity three is ranked first activity two second and activity five last with 23, 41%,22, 49 %and 14, 85 %respectively. Activity one is third with 20,38 % and activity four is ranked fourth with 18,87%.

5.2.2.4.3. Calculating the T-test

To check the significance of the difference in the results of both experimental and control group (Table 60), a t-test is used. Following the table is a presentation of the steps and formula of calculating the t-test.

Table 60
Experimental Group and Control Group Students' Achievements

Students' Achievements			
N°	Experimental Group	N°	Control Group
01	8,5	01	8,66
02	10	02	8,66
03	12	03	10,16
04	5,33	04	7,16
05	10	05	7,66
06	11	06	7,66
07	11,5	07	17,33
08	11	08	8
09	12,33	09	14,33
10	12,33	10	4,5
11	11,66	11	5,66
12	11,5	12	3,66
13	13,66	13	6,83
14	9,5	14	13, 33
15	8,83	15	7,66
16	8,83	16	8,66
17	9,66	17	7
18	13,83	18	9,83
19	9	19	8,33
20	4,16	20	10,5
21	6,16	21	8,16
22	10, 33	22	9,16
23	11,83	23	5,66
24	11,16	24	8,66
25	11	25	9
26	14,16	26	7,83
27	10,5	27	11,5
28	9,33	28	8,5
29	16	29	9
$\sum X_E$	305.16	$\sum X_c$	253, 33
$\bar{x}_E$	10,52	$\bar{x}_c$	8,74

$$t = \frac{(\bar{x}_1 - \bar{x}_2)\sqrt{(N_1 + N_2 - 2)(N_1 N_2)}}{\sqrt{(N_1 S_1^2 + N_2 S_2^2)(N_1 + N_2)}}$$

$\bar{x}_1 = \bar{x}_E$ ⟶ The mean of X_E scores: the sum of X_E scores divided by the number of cases (students) N

$\bar{x}_2 = \bar{x}_C$ ⟶ The mean of Xc scores: the sum of Xc scores divided by the number of cases (students) N

N_1 ⟶ The number of students in the Exp. Group

N_2 ⟶ The number of students in the Ctr. Group

Variance (standard deviation)

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

Table 61
Calculating the t-test

Exp. Group	Ctrl. Group
$\bar{x} = \sum x / n$ $\bar{x}_E = 305,16 / 29$ $\bar{x}_E = 10,52$ $s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$ $S^2 = \frac{181,14}{29 - 1}$ $S_E{}^2 = 6,46$ Df= (N_E + N c) – 2 = (29 + 29) – 2 = 58- 2 = 56	$\bar{x} = \sum x / n$ $\bar{x}_c = 253, 05 /29$ $\bar{x}_c = 8,72$ $s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$ $S^2 = \frac{217,72}{29 - 1}$ $Sc^2 = 7,98$ Df= (N_E + N c) – 2 = (29 + 29) – 2 = 58- 2 = 56

$$t = \frac{(\bar{x}_1 - \bar{x}_2)\sqrt{(N_1 + N_2 - 2)(N_1 N_2)}}{\sqrt{(N_1 S_1^2 + N_2 S_2^2)(N_1 + N_2)}}$$

$$t = \frac{(10,52-8,74)\sqrt{(29+29-2)(29 \times 29)}}{\sqrt{(29\times 6,46+29\times 7,77)\,(29+29)}} = \frac{1,78\sqrt{(56)(841)}}{\sqrt{(187,34+225,33)(58)}} = \frac{1,78\sqrt{47096}}{\sqrt{(412,67)(58)}} = \frac{1,78\times 217,01}{\sqrt{23934,86}} = \frac{386,27}{154,70} = 2,51$$

t= 2.51

The results recorded in Table 61 above, indicate the t-obtained is higher than the t- tabulated (2.51 > 1.67, the difference is 1.12), we can say the null hypothesis (H_o), that assumes that the difference in performance between the groups is due to chance, is rejected and the alternative hypothesis (H_1) is accepted. In other words, the result of our experiment is significant because at 0.05 it allows to determine that the results obtained are due to the research treatment rather to chance.

5.2.3. Summary and Discussion of the Findings

Before embarking on the discussion of the obtained results, it seems important to review the main findings achieved which can be grouped in three main points:

- Students from both groups have a close level in both proficiency and reading in English as shown is the previous sections (see section 2.1 and 2.2.1) which can be described as poor level.
- There is a positive correlation between students' poor level in language and poor comprehension.
- Students in the experimental group have gradually progressed in their reading comprehension level.

Subsequently, our discussion is, then, grounded on the above main findings.

5.2.3.1. Students' Level in English

A detailed reading of Tables 31 and 32 , which summarise the students' scores in both Entry Tests, reveals that sample subjects (experimental and control group) have a very poor level in English. Both groups have proved to have a very close level, with 0,11 difference in the mean in their performance in the linguistic tests (Table 35) . To precise, not only the respondents fail in identifying the meaning of some non-technical

vocabulary, as the examination of Table 36 reveals; but also shows their limited knowledge in grammar (Table 36).

As far as the comprehension test (pre-test) is concerned, both groups have shown a close performance with 0,02 difference in the means (Table 43). Their scores reflect their poor reading comprehension level prior to the treatment period. On the other hand, sample students have problems with comprehension and it can obviously be seen in Tables 48, 49, 50,51, and 52 where they failed in answering the comprehension questions. Basically, we used a variety of questions to reveal different points of students' deficiencies in comprehension which can be seen at basic units level (the word level, sentence level, paragraph level) as they indicated in their answers in the questionnaire (Table 27).

5.2.3.2. Students' Linguistic Knowledge and Comprehension

In the previous section, we have reached the conclusion that subjects do not only have a poor knowledge in language but they also have a poor reading comprehension level. In fact, the findings have demonstrated that there is a positive correlation between these two variables (knowledge of language and reading comprehension) which is proved via calculating the correlation coefficient test (Table 62). It can be clearly read from the Table 62 below that H0 is rejected since robs <rcrit is not achieved. However, the results indicate that robs> rcrit ("robs" obtained r =0,81 is higher than the critical value "rcrit" r= 0,22 at 0,05 level of significance) which means that our hypothesis is accepted. In other words, these findings reported that students who have a poor knowledge in language have poor reading comprehension level and those who have good knowledge in language have a good reading comprehension level, except for few cases but this do not affect the overall results. This idea is widely highlighted in the literature review on reading in FL.

Table 62
Statistical Results of the Coefficient Test

Statistical hypotheses	H_0: robs <rcrit H_1: robs> rcrit
Alpha decision level (one tailed test)	$\alpha = 0.05$
Number of participants	N= Ne + Nc= 58
Degree of freedom	N-2= 56
Observed statistics	robs = 0,81
Critical value	rcrit = 0,22
Results	At α <0, 05 df 56 robs> rcrit

5.2.3.3. Students' Progress in Reading Comprehension Performance

The analysis of the data obtained (observation grid tests) demonstrates that the experimental group made a significant progress in reading comprehension over the three post-tests in contrast to the control group that made no sound improvement (Table 37). This development in students' performance is statistically well stated and it offered validity for these differences in students' reading level (Table 63). The results displayed in the Table 63 reveal that the value of our calculated *t* exceeds the value of the tabulated (the critical value of *t*, with 56 degrees of freedom, is 1,67, at 0, 05 level of significance in is one tailed test) tobs> tcrit = 2,52> 1,67 tcrit. Since it is statistically significant. Thus, confirming that the difference between the means of the post-test for the control group and the experimental is highly significant. To state it differently, these results indicate that Master One students of Electronics made a progress in reading comprehension performance after they have mastered how the aspects of language treated are used in context. Ultimately, they learnt to use this knowledge while reading to comprehend the text.

Table 63
Statistical Results of the T-test

Statistical hypotheses	H0: tobs <tcrit H1: tobs> tcrit
Alpha decision level (one tailed test)	$\alpha = 0.05$
Number of participants	N= Ne + Nc= 58
Degree of freedom	N-2= 56
Observed statistics	tobs = 2.52
Critical value	tcrit = 1.67
Results	At α <0, 05 df 56 tobs> tcrit

5.3. The Observation

The unstructured observation tend to describe all the behaviour in a particular situation. For that, we have taken every possible remark in a form of a note than we have selected and grouped into notes to be analysed. No checklist was used all what we felt interesting was recorded. The notes selected are grouped in three main categories:

5.3.1.Students' Linguistic Level

The students showed a very limited knowledge in both general and specific English. Further, students expressed their poor ability in producing language either through writing or even speaking tasks. Most of what students say is chunks made of a mixture of French, English and Arabic which is, in fact, a strong characteristic of their participation in the classroom. In addition, the subjects were unable to form simple English sentences with the information provided (about defining, Entry Test 01 question two See Appendix 4). The following examples serve as a good illustration:

(a): Unit /for measuring / electric current/ an ampere.
An ampere is a unit for measuring electric current.
(b): Place/ a laboratory/ experiments are performed.
A laboratory is a place where experiments are performed.

In the above examples, all what students need to do is just to reorder the information and place the auxiliary to be in the right from (is) and in its appropriate place (after the subject an ampere/ a laboratory) along with the adequate relative pronoun for the second example. However, only 07 students (form both groups) answered correctly in example one against 03 students who made it correct for the second example.

While correcting, we have noticed that students do not have a solid foundation in tenses, namely the present and the past tenses. This is clearly stated in their results (scores) when asked to place the verbs in the right form (appropriate tense). Although most of the students know what the rule is about, they made many mistakes in applying it in the same context. The following example is a good illustration:

> Energy (be)……. the ability to do work when a hammer strikes a nail it (exert)…… a force on the nail that causes it to move. The movement of the hammer (have)……. the ability to do work and therefore has a form of energy that we call kinetic energy. Kinetic energy (be)…….. the energy of motion.

Both the first and the last sentence in this short paragraph have the same structure and the same function; i.e., the same form of "to be" which is "is". However, only 10% of the students gave correct answers for both cases, against 65% of them gave one of the cases correct. These findings proved that these students don't master how to use the tenses, namely the present and the past. In short, the students proved to have serious problems with the English language.

5.3.2. Students' Motivation

The subjects showed high interest in learning English and expressed their awareness of the importance of the English language in their studies. Students in the experimental group seemed happier than students in the control group. Their motivation

is reflected in their regular attendance, their participation in the classroom, and their engagement in working out the exercises. These students enjoyed having more about the grammar rules as they recognise its communicative usage in the texts presented. They liked what we provided and considered for they understood how such simple language aspects can be of a crucial importance in conveying information in science. Nevertheless, most of the students from the control group expressed their boredom when it comes to introducing grammar rules after they fail in understanding the reading passages offered. This is due to their ignorance of the close relation between understanding the discoursal elements and their communicative usage in improving their comprehension .

5.4. Putting It All Together

In this study, the participants are Master One students of Electronics who are supposed, next year, to write a dissertation in their field of study using English references. They have studied English as a Foreign Language for six (06) years: two (02) years at the Elementary school, three (03) years at the Secondary school, and one (01) year at the university. They seemed motivated to improve their level in English and to know more about learning how to read in English. These aspects were important for carrying the experiment.

Given the facts of the questionnaire and the tests with attention to all the observations, we can say that all the results obtained in this experimental part not only offered a clear picture of the teaching/ learning situation of English at the Department of Electronics but also confirmed our three hypotheses. The analysis of the data obtained on target students showed that the subject students are interested in learning English and most of them prefer to have English courses from the first year at university and

expressed its crucial importance for their studies. In addition, they suggested to be exposed to more ESP reading materials with focus on grammar and vocabulary. Besides, they expressed their wish to be taught qualified ESP teacher. More importantly, it offered a clear vision on students 'necessities, wants, and lacks which can be listed as follows:

1. The subjects' necessities are purely academic vis-à-vis the importance of English for their academic success. Our subjects are to some extent aware of needs which are basically grounded having an adequate level in English to function effectively in the target situation. As far as their language skills are concerned, students stated are in dire need for the reading skill which they regard as the most important skill and they prefer to have reading lessons in the English course. Students' preference of reading is justified by the variety of benefits they get from it in broadening their academic scopes like accessing to the last-up-dated information in their field. Most of all, they believe that it is a great means to expose to authentic scientific English since it is not the medium of instruction nor of communication, it is simply, taught as a compulsory module at a rate of one sessions per week. In this respect, most of the respondents, expressed their need for having more session per week.

2. For learners wants, students want to improve their English to use it in a variety of situations. Their wants towards studies are mainly mastering the technical terms wishing to be able to communicate effectively. They expressed their strong desire to develop their speaking skills.

3. Finally, we have discovered that students have a poor knowledge of General English. Surprisingly, the subjects not only have serious lacks in their usage and understanding of present simple, present simple and passive voice, but they were not able to write

simple sentences in English. The sample subjects lack the adequate GE knowledge needed for learning EST.

As far as the students' needs are concerned, the first hypothesis is confirmed. The reading-oriented method in teaching English to Master One students of Electronics is proved to be effective in increasing students' motivation and interest in learning.

Furthermore, the results indicated that the respondents not only have a poor level in English (in grammar and vocabulary) but also in the reading comprehension performance. What learners have stated in their responses to the questionnaire is reflected in their scores in both tests (linguistic and comprehension). It must also be noted that their reading difficulties are mainly language related. The data obtained indicated that our subjects suffer from a linguistic handicap which affects their reading performance; i,e., students who showed limited and lack of knowledge in language they performed poorly in reading comprehension tests and vice-versa. Thus, the second hypothesis is confirmed and validated via the findings of the correlation coefficient test.

Concerning the third hypothesis, it is also confirmed via a t-test that validate the significance in students' performance (experimental and control group). The results are proved to be statistically significant. Thus, confirming that the difference between the means of the post-test for the control group and the experimental is significant. Accordingly, it proved the effectiveness of our treatment in improving the students' comprehension of scientific and technical texts written in English.

Conclusion

This chapter has presented the detailed analysis and interpretation of the obtained results of the students' questionnaire, proficiency tests, comprehension tests and the researcher's observations. It has provided answers to the set hypotheses stated in the

introduction apart from the obtained results. The findings confirmed *hypothesis one* as they highlighted the importance of implementing reading-oriented course for Master One students of Electronics in making learning more interesting and motivating. For *hypothesis two,* the results validated the correlative relationship between the learners' poor level in general English and their poor comprehension. The findings of this chapter also brought light to the fact that the changes and the differences in the students' reading achievements of the experimental group are due to the efficiency of the treatment, thus, confirming *hypothesis three*.

General Conclusion and Recommendations

Reading occupies an important place in English for Science and Technology. It is proved that a correlational relationship between reading and academic success is seen in all the educational settings. In fact, reading is at the heart of much of what EST students do, both in acquiring knowledge of target community discourse and in conjunction with the use of another skill, such as writing. This is so particular for Master One students of Electronics for as most, if not all, of the up-to-date documents in the field are written in English. The present study has brought some light to the importance of the reading skill, which is completely ignored in EST classrooms, in learning a foreign language.

In the context of the Department of Electronics at the University of Constantine 1, our pedagogic setting of interest, such documents written in English represent an important source of language input for learners. However, not all of the students have the access to the content-information of these documents because of their reading comprehension problems. Actually, the inadequate level in English (General English) is listed as the major reason for such problems. In such setting, an EST vs. GEP dilemma is always present between the learners' perceived needs and wants. Consequently, most of the students finish their studies without any sound benefit from the courses given. To overcome this issue, we have tried to shed some light on such an issue that exists in teaching English to EST learners, which does not equip Master One students of Electronics with the necessary reading abilities to overcome any EST reading comprehension problem it ever surfaces. We have discussed on how important it is for students to learn and master GE before moving to learn and understand EST discourse. The main objective of this research is to enable Master One students, subjects of our population, to employ their acquired linguistic knowledge in reading and understanding

scientific and technical texts effectively. In such a line of thought, we hypothesised the following:

1) If the teaching of English to Master One students of Electronics is basically reading-oriented, learning will be more interesting and motivation.

2) If Master One students of Electronics are fluent enough in General English, they will easily handle EST texts.

3) If the teaching of reading to Master One students of Electronics focuses on equipping these learners to identify and make use of the EST discourse features, including the non-technical vocabulary and the grammatical-rhetorical relationships per se, their reading comprehension of EST texts will be enhanced.

Prior to the testing of our hypothesis, a survey of the related literature was presented over the first three chapters. These chapters offer an overview on the underlying aspects of the main topic under investigation reading EST texts which includes reading courses, reading comprehension, and teaching English to EST learners. Next, chapter four was consecrated to the description of the experimental design and the tools of research, namely questionnaires to students and linguistic and comprehension tests. Before undertaking the research per se, a pilot study was conducted which allowed for the necessary adjustments for the main research. Chapter Five was all for the description, analysis and discussion of the results obtained from both instruments of research. The analysis of data allowed us to understand the subjects' problems and we tried to provide some conclusive observations in relation to the research questions and the hypotheses.

The analysis of the students' questionnaires offered rich and in depth insights about the real teaching / learning situation of English in the Department of Electronics.

It offered a clear vision on our students' needs and lacks, preferences, attitudes and problems in relation to reading. Our subjects are interested in learning English and most of them prefer to have English courses from the first year at university. They all expressed their awareness of the crucial importance of English for their studies. In addition, they revealed that their needs are purely academic, basically grounded on having an adequate level in English to function effectively in the target situation. The informants stated that they are a in dire need for ameliorating their reading skill which they regard as the most important skill for the benefits it offers for broadening their academic scopes like accessing to the last-updated information in their field of study.

The respondents admitted that they have poor level in English and poor reading level which were proved in their scores in both tests. They explained that their poor proficiency cause them many serious comprehension difficulties. They added that the main causes of their comprehension problems are the unknown words and grammatical structures, the organisation of information and the link between sentences. For vocabulary, technical vocabulary and semi-technical vocabulary do equally create significant problems to subjects. These results confirmed the *first hypothesis* that assumes the importance of having a reading course to Master One students needs and make learning more motivating and interesting.

Additionally, the statistical analysis of the test scores did confirm the second and the third hypothesis. The *second hypothesis* is validated via the findings of the correlation coefficient test (r =0,81). Such a correlation confirmed that there is a close relation between students' linguistic knowledge in General English and comprehension level, students who showed limited and lack of knowledge in language they performed poorly in reading comprehension and vice-versa apart from some exceptions which did not affect the overall claim. For the *third hypothesis*, it is also confirmed via the t-test

(tcrit=2,52) which validates the significance in students' performance between the control group and the experimental group. It proved the improvement in students' comprehension (of the experimental) after the treatment that involves reading courses that highlight the grammatical-rhetorical relationships and non-technical vocabulary.

In the light of the findings and for enhancing the teaching situation and particularly boost the learners' proficiency and assist them in developing their reading performance in the Electronics Department, and by extension in all the Algerian EST institutions, the following recommendations are made:

- Firstly, the English course should be introduced in the Department of Electronics from the first year to ensure a continuous language learning process. It is interesting to consider aspects of the timetable of the English session and the number of session per week. If need be, [in collaboration with the administration] extra more sessions could be added.

- It is important to encourage language teachers to work in collaboration with subject specialist to overcome their problem of language content.

- Teachers of English need to be trained in teaching ESP to conduct needs analysis projects to reveal the learners' true learning needs' in order to organise course objectives and prepare convenient teaching materials, and in the long run design a syllabus for the Electronics learners. Such a syllabus is expected to:

1. Satisfy the learners' needs in terms of necessities, lacks, and wants.

2. Alleviate the students' level in English and narrows down the gap between the students' present level in GE and the needed level to learn EST.
3. Introduce stimulating and comprehensible reading materials using different language inputs from general to specific [different sources, different types of writing, different levels of difficulty, visual imagery (instance, figures, charts, and video if possible)].
4. Provide the appropriate and the relevant activities that aim at developing the language skills (grammar vocabulary and text organization) together with activities that aim at developing reading skills and strategies (skimming, scanning, and guessing).
5. Enable students understand how the subject matter is expressed in English and develop their reading skill to be independent readers by increasing their awareness of reading strategies and offering more opportunities for reading practice.
6. Encourage the English-English communication in class between teachers and students in classroom rather than Arabic or French
7. Specific instruction should be integrated into the ESP reading course to prepare students become more successful readers according to the environment, conditions, and constraints).

On the whole, we hope that our study has helped to see more clearly into the issue of teaching reading and implementing reading courses to EST learners at the Department of Electronics, University of Constantine1. We believe that taking the aforementioned suggestions into account will bring, it is hoped, sound improvements in the teaching/ learning of EST in the Department of Electronics, University of Constantine1.

Last but not least, we hold that a larger-scale study with more participants would provide more data, and therefore a much clearer picture to determine the nature of issues under study to adjacent departments in the University of Constantine 1, and by extension to the other departments in the Algerian universities.

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Appendices

Appendix # 1

University of Constantine 01.
Department of Letters and English Language.

Pilot Questionnaire

Dear students,

You are invited to participate in the current research through filling in the questionnaire below. Please, answer each statement by ticking / √ / in the right box.

01. Do you like learning English?

yes ☐ no ☐

02. Your level in English is:

good ☐ average ☐ low ☐

0 3. Do you think your present level in English permits you to learn specialised English?

yes ☐ no ☐

04. What do you think of one session of English per week ?

enough ☐ acceptable ☐ not enough ☐

05. To what extent the courses given by teachers help you learn English?

completely ☐ partly ☐ slightly ☐ not at All ☐

06. What do you need English for?

- Having access to last-up-to- date information
- Passing an exam ☐
- Surfing on the Net and chatting with friends ☐
- Succeeding in your studies ☐
- Communicate with people ☐
- Others, please specify……

……

……

07. Which type of language you need to learn?

General English ☐ Technical English ☐ Both ☐

08. According to your needs, the English course should contain:

Grammar exercises ☐ Translation ☐

Listening Comprehension ☐ Reading Comprehension ☐

General vocabulary exercise ☐ Technical Terms ☐

Oral Expression ☐ Written Expression ☐

Analysing texts ☐

Others, please specify……

……

……

09. In your opinion, which is (are) the most useful in learning English?

to read texts and understand ☐ to listen and understand ☐

to write scientific reports ☐ to speak (class discussions) ☐

10. According to your needs, order the following skills (1-most needed to 4- least needed)

speaking ☐ writing ☐ reading ☐ listening ☐

11. Do you read in English?

yes ☐ no ☐

12. How often do you read in English ?

always ☐ often ☐ sometimes ☐ rarely ☐ never ☐

13. What do you read in English?

Texts of exam ☐ document in your field of speciality ☐

books ☐ newspapers and magazines ☐

Short stories ☐ Internet articles ☐

Others, please specify……

14. What are the topics you read in English?

sports ☐ politics ☐ economy ☐

electronics ☐ fashion ☐ arts and culture ☐

global events ☐ science ☐ history ☐

Others, please specify……

15. You read in English because:

you are recommended to	☐	you need to answer the questions of the exam	☐
it's your pleasure	☐	to improve your level in English	☐
you find the topic interesting	☐	the information you need are available in English	☐

Others, please specify……

16. What do you understand when you read?

few words	☐	some phrases	☐	full sentences	☐
general idea	☐	detailed ideas	☐	whole text	☐

17. How do you find what you read in English?

very difficult to understand	☐	difficult to understand	☐
easy to understand	☐	very easy to understand	☐

18. If you read with difficulty, how often do you have difficulties?

rarely	☐	sometimes	☐	often	☐	always	☐

19. If you have difficulties in understanding, they are at the level of:

understanding words	☐	understanding the general idea	☐
understanding full sentences	☐	understanding of the relationships between ideas	☐
understanding the details and supporting details			☐

Others, please specify……

20. What does affect your reading comprehension?

grammatical structures	☐	length of the text	☐
general vocabulary	☐	topic of the text	☐
technical vocabulary	☐	lack of background knowledge	☐
organisation of information	☐	reading strategies	☐

Others, specify please……

21. Do you have any suggestion to make the English courses more effective and useful?

……
……..……
……..……
……
……

Thank you very much.

Pilot Questionnaire: Evaluation Sheet

1. Are there any questions unclear or ambiguous?

   yes ☐ no ☐

2. If yes, please specify?

3. Are there any difficult words unclear or ambiguous?

   yes ☐ no ☐

4. If yes, please specify?

……
……
……
……

Appendix # 2

University of Constantine 01.
Department of Letters and English Language.

Students' Questionnaire

We would like to ask you to answer the following questions. Please put (x) in the correspondent box.

01. Do you like learning English?

yes ☐ no ☐

02. Your level in English is:

very good ☐ good ☐ average ☐ low ☐ very low ☐

0 3. Do you think your present level in English permits you to learn specialised English?

yes ☐ no ☐

04. What do you think of one session of English per week ?

enough ☐ acceptable ☐ not enough ☐

05. To what extent the courses given by teachers help you learn in English?

completely ☐ partly ☐ slightly ☐ not at all ☐ don't know ☐

06. What do you need/want English for? Needs

- Reading documents in your field of specialism ☐
- Writing scientific reports and scientific papers ☐
- Having access to recent information ☐
- Passing an exam ☐
- Surfing on the Net and chatting with friends ☐
- Getting a job ☐
- Communicate with people ☐
- Others, please specify……

……

……

07. Which type of language you need to learn?

General English ☐ technical English ☐ both ☐

08. According to your needs, the English course should contain:

grammar exercises ☐ translation ☐

Listening Comprehension ☐ general vocabulary exercise ☐

technical terms ☐ Oral Expression ☐

Written Expression ☐ structure of scientific English ☐

reading and comprehending documents related to your field of speciality ☐

Others, please specify……

……

……

09. In your opinion, which is (are) the most useful in learning English?

to read texts and understand ☐ to listen and understand ☐

to write scientific reports ☐ to speak (class discussions) ☐

10. According to your needs, order the following skills (1-most needed to 4- least needed)

speaking ☐ writing ☐ reading ☐ listening ☐

11. Do you read in English?

yes ☐ no ☐

12. How often do you read in English ?

always ☐ often ☐ sometimes ☐ rarely ☐ never ☐

13. What do you read in English?

Texts of exam ☐ document in your field of speciality ☐

E-mails ☐ newspapers and magazines ☐

Short stories ☐ Internet articles ☐

Others, please specify……

14. What are the topics you read in English?

sports ☐ politics ☐ economy ☐

electronics ☐ fashion ☐ arts and culture ☐

global events ☐ science ☐ history ☐

Others, please specify……

15. You read in English because:

you are recommended to ☐ you need to answer the questions of the exam ☐

it's your pleasure ☐ to improve your level in English ☐

you find the topic interesting ☐ the information you need are available in English ☐

Others, please specify……

16. What do you understand when you read

few words ☐ some phrases ☐ full of sentences ☐

general idea ☐ detailed ideas ☐ whole text ☐

17. How do you read in English?

Easily ☐ fairly easily ☐ with difficulty ☐

18. If you read with difficulty, how often do you have difficulties?

rarely ☐ sometimes ☐ often ☐ always ☐

19. If you have difficulties in understanding, they are at the level of:

understanding words ☐

understanding sentences ☐ understanding the general idea ☐

understanding the details ☐ understanding of the relationships between ideas ☐

Others, please specify……

20. What does affect your reading comprehension?

organisation of information ☐ length of the text ☐

technical vocabulary ☐ topic of the text ☐

general vocabulary ☐ lack of background knowledge ☐

grammatical structures ☐ Reading strategies ☐

Others, specify please……

21. Do you have any suggestion to make the English courses more effective and useful?

……

……..……

……..……

……

……

Thank you very much.

Appendix # 3

University of Constantine 01.
Department of Letters and English Language.

Pre-test

Read the text below and answer the questions that follow:

……

It is usual to consider electric current as a flow of electrons from one point to another through a medium, or even through a vacuum. If the electron flow takes place in a vacuum, as in the case of electronic valves, the electrons will travel at considerable speeds, since little resistance is offered by the medium and fewer impacts will occur between the electrons. If the medium is a solid- in which case the electrons are more tightly packed- the electron flow will be slower.

All substances may be classified electrically as conductors or insulators, according to the degree of resistance which the medium offers to the flow of current. Most liquids, particularly solutions in liquids, are good conductors. Most gases at normal temperature and pressure are good insulators, but gases maintained at how pressure in a sealed tube allow a flow of current to take place as a result of ionisation of the gas molecule. Solids vary greatly in resistance, some being very good conductors, while others are so resistant that they referred to as insulators. Electric current is normally transmitted along annealed copper wire.

The resistance of any material to the flow of current is affected by a number of factors, such as the length of cross-section of the conductor, and by its resistivity, which is a specific property of the material at a specific temperature. The temperature therefore also has come effect on the resistance of the material: in most of the cases, an increase in temperature causes an increase in resistance. With certain metals, such as copper or iron, the change in resistance which attends on changes in temperature is relatively large- a fact which is utilized in the resistance thermometer , in which it is possible to measure temperature changes, as in the windings of an electronic motor, for instance, by the change in resistance.

Some materials have a very high resistance, and as such they can be used as insulators to prevent the leakage of current. Among these materials are asbestos, celluloid, porcelain, cotton and rubber, and recently a number of new materials have been developed, including synthetic textiles such as nylon, and synthetic resins such as vinyl resins. The resistivity of most insulators decreases with an increase in temperature, for which reason the temperatures in insulated conductors must be kept reasonably low. A breakdown of insulation may occur under the application of very high voltages, and it is necessary to know the dielectric strength of any insulating materials. Some materials, such as cotton, which is often used as insulation, are reliable to absorb moisture, and this will adversely affect their insulating properties. Rubber, which is a standard insulating material, is liable to deteriorate under sun light, and it is therefore advisable to protect it with some weatherproof material.

(From: The Structure of Technical English by Herbert,1965, p. 124)

1. Say True, False or not mentioned. Correct the false ones:

a. The flow of electrons through a vacuum is also called electric current.

b. All liquids, especially solutions in liquids, are good conductors.

c. Solids have different levels of resistance.

d. The increase of temperature always causes the increase in resistance of all substances.

e. Some materials are neither conductors nor insulators.

f. There is an inverse relationship between temperature and resistance.

2. Choose the right answer for the following questions:

a. What affects the speed of electron flow?

- The impact between electrons.
- The medium current flows through.
- The volume of the vacuum.

b. What is the basis for classifying substances electrically?

- Nature of matter.
- Temperature and pressure.
- Resistance to current flow.

c. The flow of current is ensured if

- Temperature is increased for insulators.
- Temperature is increased for conductors.
- Temperature is increased for conductors and decreased for insulators.

d. What is the appropriate title for the text?

- Conducting Electricity.
- Conductors and Conductivity.
- Electrical Resistivity and Conductivity

3. Choose (circle) the right meaning of the words in bold from the following:

* It is usual to consider electric current as a **flow** of electrons from one point to another.

a. movement b. stream c. flood.

* The electrons are more **tightly** packed

a .regularly b. loosely c. firmly.

* The **resistance** of any material to the flow of current is affected by a number of factors.

a. achieve b. abandon c. complete

* Electric current is normally **transmitted** along annealed copper wire.

a. passed b. conveyed c. sent

* New materials have been developed, **including** synthetic textiles such as nylon, and synthetic resins such as vinyl resins.

a. containing b. excluding c. comprising

4.Summarise the text in a simple diagram.

5.Fill in the gaps with the appropriate words from the list. Change the form of the word if necessary. Use each word only once.

released - be - work - batteries - was - energy - chemically- electrical - components- that- is – battery – storage-

Energy can be stored chemically. When there is a chemical reaction, energy is…… In an explosion, this energy can ……released as heat, light, and mechanical motion. In some arrangements, chemical ……can be released electrically. A battery …… an arrangement of chemicals that react when the active …… are allowed to circulate their electrons in an external circuit. The energy that is stored……is potential energy …… is available to do electrical work. In rechargeable …… the chemistry is reversible and energy can be put back into the battery.

(From: The Field of Electronics by Morrison, 2002, p.10)

Appendix # 4

University of Constantine 01.
Department of Letters and English Language

Entry Test 01

1. Put the verb between brackets in the right form (05 points)

Energy (be)……. the ability to do work when a hammer strikes a nail it (exert)…… a force on the nail that causes it to move. The movement of the hammer (have)…….. the ability to do work and therefore has a form of energy that we call kinetic energy. Kinetic energy (be)…….. the energy of motion.

An object may (have) ……energy not only because of its motion but also because its position and shape. For example, when a watch spring (be)…… wound, it (store)……. energy. When this energy is released it will do the work of moving hands of the watch. This form of energy (call) …….potential energy. Potential energy(be)…… stored energy. Water in a dam (be)…….. another example of potential energy.

2. Using the information in each series, write a simple definition (10 points)

1. Place/ a laboratory/ experiments are performed.

……

2. A machine/ device/ transforms energy from one form to another.

……

3. An insulator/ does not conduct heat or electricity/substance.

……

4. Unit /for measuring / electric current/ an ampere

……

5. Transistors/ devices/ semiconductor / used to amplify and switch electronic signals and power.

……

3. Choose the right meaning for the words in bold (05 points)

- One area of electronics is concerned with the **storage** of information.
  a. display b. change c. keeping.
- The input **receives** and converts information.
  a. sends b. gets c. extracts
- Repeater **boosts** the electrical signal so that longer cables can be used.
  a. enhances b. converts c. works.
- When opposite chemical reactions occur at the same rate, a state of **equilibrium** exits.
  a. disorder b. balance c. confusion.
- Larger vehicles **consume** more gasoline than smaller ones.
  a. operate b. save c. use.

Appendix # 5

University of Constantine 01.
Department of Letters and English Language

Exit Test 01 (Post-test 1)

Read the text and answer the questions that follow:

……

Electricity refers to the basic energy we use for power. It generally involves the generation and distribution of electrical energy to homes, businesses, and factories. Electricity is energy that is produced by the coal-fired or nuclear power plant and then sent to you over long transmission lines until it comes into your house where you access it through your AC wall outlets.

Electricity is moving electrons. An electron is a tiny particle that is inside the atoms that make up everything we can feel, see, and even not see. If we can get some electrons moving together in a wire, electrical or electronic component, or circuit, we can control them to do many useful things, such as amplification, for example. Moving electrons make up what we call current flow. And current flow is produced by electrical energy called voltage. Voltage comes from batteries, the AC wall outlet, and lots of other sources including power supplies, solar cells, microphones, and the like. If we can control the electrons we can produce magic results. That is what electronics is all about. We control the electrons with components like resistors, capacitors, inductors, transistors, and all sorts of Integrated circuits. We create circuits that actually process the electron flow. We can call the voltages that create current flow and the resulting current signals. The circuit processes the signals to produce the end effect that we want, be it a radio, a computer, or DVD player.

(From: Electronics Explained by Frenzel, 2010, pp: 6-7)

1. Say True, False or Not Mentioned. Correct the false ones.
a. Electricity is a kind of energy.
b. Atoms can make up things that we do not see.
c. Electrons can never be controlled.
d. Current flow is the movement of electrons.
e. Voltage comes from one source, which is the battery.

2. Choose the right answer for the following questions:
A. How electronics gets to the houses?
- Through the AC wall outlet.
- Through the power plant.
- Through transmission lines.

B. What is Voltage?

- A supply of water.
- An electrical energy.
- A current flow.

C. What is the role of the Integrated circuit?

- Process electrons.
- Control electrons
- Process signals.

D. What is the appropriate title for the text?

- Electricity.
- Electrons and the Production of Electricity.
- Electronics and Electricity

3. Choose the right meaning of the words in bold from the following:

- It generally **involves** the generation and distribution of electrical energy.
  a. absorbs b. includes c. excludes
- An electron is a tiny **particle** that is inside the atoms that made up everything.
  a. spot b. unit c. element.
- This is electrical pressure trying to move electrons so that the chemicals in the battery can **attain** a lower energy state.
  a. achieve b. abandon c. complete
- We control the electrons with components like resistors, capacitors, inductors, transistors, and all **sorts** of integrated circuits.
  a. kinds b. natures c. manners
- We can call the voltage that creates current flow and the **resulting** current signals.
  a. causing b. effecting c. ending

4. Summarise the text in a diagram.

5. Fill in the gaps with the appropriate words from the list. Change the form of the word if necessary. Use each word only once.

electricity- attraction - Are – protons – examples- pole - contains – imagine – charge -- acts- have – negative – each – magnets -

Electrons are one of the building blocks of nature. Electrons …….. buddies with another of nature's building blocks, protons. Electrons and …….. are very small and are contained in well, everything. A speck of dust …….. millions and millions of electrons and protons, so you can …….. how many there are in your average sumo wrestler.

Electrons and protons …….. equal and opposite electric charges, with electrons having the …….. charge and protons the positive. Opposite charges are attracted to ……..other. You can visualize a similar type of attraction by putting the ends of two …….. together. If the ends of the magnets are opposite poles, the magnets cozy right up to each other and stick together.

(From: Electronics for Dummies, by McComb & Boysen, 2005, p.10)

Appendix # 6

University of Constantine 01.
Department of Letters and English Language.

Entry Test 02

1.Put the verb between brackets in the right form (05 points)

An acid is a compound containing hydrogen which can (replace)……, directly or indirectly, by a metal. Its solution in water turns blue litmus red.

Acids can (classify)……. into two groups. Acids which always contain the element carbon (call)…… organic acids and they often come from growing things, like fruit. Citric acid which (find)…….. in lemons and oranges and other citrus fruits, and acetic acid, which (find)……. in vinegar, are organic acids. Acids which do not contain the element carbon (know)…… as inorganic acids.

2. Using the information in each series, write a meaningful sentence (10 points)

1. Two/ of charge / there/ positive charge and negative charge.

There ……..……..…..: ……...

2. Five important / of compounds/ acids, bases, salts, metallie, oxides, and nonmetallic oxides

…….... ……..……...……..

……

3.Into/ cells/ four/ Zinc-chloride, Lithium , , Silver oxide , Zinc-carbon, and Alkaline.

……

……..

4. As/ Carbon, silicon, and germanium / semiconductors.

…….…….…….…….…….…….

5.A conductor/ frequently/ as / according /to its electrical conductivity/ or semiconductor/ matter.

……

……..

3. Choose the right meaning of the words in bold from the following (05 points)

- The number goes to the computer which **instantly** shows the price of the product on the checkout display.

  a. correctly. b. immediately. c. clearly.

- A binary code signal is a **sequence** of electrical pulses.

  a. precedence. b. mixture c. series

- An atom has no change because positive protons **cancel** negative electrons.

  a. neutralize. b. dominate c. attract.

- Oil and water **repel** each other.

  a. resist. b. attract c. move.

- IC stands for **integrated** circuit.

  a. separated. b. incorporated c. lapped

Appendix # 7

University of Constantine 01.
Department of Languages.

Exit Test 02 (Post-test 2)

Read the text and answer the questions that follow:

.....

There are many types of resistors used in analog design. Stability, accuracy, noise generation, and specific value are parameters that dictate the resistor type that is selected. Carbon resistors are perhaps the most common type used. They are available in standard values from 10to 22 M. On special order the range extends from a few ohms to hundreds of megohms. These resistors are available in wattages from18 to 2W. Metal film resistors are also available in a wide range of standard values and tolerances. The resistance is varied by changing film thickness and changing the length of a spiral cut into the body of the resistor.

All resistors are noise generators. The random motion of atoms in the resistor generates what is known as *Boltzmann's noise*. This noise increases as the square root of absolute temperature. For resistors below 10,000, this noise is below 1V in the band dc to 100 kHz. Carbon resistors have a noise figure that is higher than the theoretical value. This noise increases as the resistor is stressed by an electric field. In sensitive circuits where noise contribution is a problem, wire wound resistors are used. Wire wound resistors are made to order to specific values and tolerances. The wire used in construction makes use of special alloys. These alloys form thermocouples at points of copper contact. In input circuits that handle dc signals and where the resistors must dissipate heat or the circuit heats up, these thermocouples can create an unwanted dc voltage. Special alloys can be used to limit this problem. In low-value resistors, part of the coil is reverse wound to limit any inductance. In high-value resistors the wire can be wound in two or more sectors to reduce end-to-end capacitance. These winding techniques are used to provide a resistor that is effective over a wide frequency range.

(From Field of Electronics Understanding Electronics Using Basic Physics by Morrison, 2002, p. 109).

1. Say True, False or Not Mentioned. Correct the false ones:
a. Resistors are randomly selected.

b. The value of carbon resistors range from ohms to megaohms.
c. Boltzmann's noise is a type of resistors.
d. The electric field has an effect on the noise generated by the resistors.
e. Resistors are parts of the input circuits.

2. Choose the right answer for the following questions:
a. On which basis resistors are classified in this text?
- Noise generation.
- The resistor value.
- The resistance.

b. What is the problem that can be solved by the use of special alloys?
- Low value resistors.
- DC voltage.
- Theromocouples.

c. What is the appropriate title for the text?
- Resistance.
- Conducting Electricity.
- Conductors and Conductivity

3. Choose the right meaning of the words in bold from the following:
* Carbon resistors are perhaps the most **common** type used.
a. frequent b. familiar c. important
* On special order the **range** extends from a few ohms to hundreds of megohms.
a. restrict b. struggle c. complete
* In sensitive circuits where noise **contribution** is a problem, wirewound resistors are used.
a. interest b. reduction c. involvement
* This noise increases as the resistor is **stressed** by an electric field.
a. ignored b.forced c. reduced
* In high-value resistors the wire can be wound in two or more **sectors** to reduce end-to-end capacitance
a. field b.whole c. parts

4. Summarise the text in a diagram.

5. Fill in the gaps with the appropriate words from the List. Change the form of the word if necessary. Use each word only once.

Conductivity- positive- electrons - use- electronic- electric- conductors- store – sequence- devices- insulators – patterns- electricity – substances- repel.

Matter is frequently classified to its electrical…….conductors……., nonconductors, or semiconductors. Conductors have many …….. that are free to move, and are useful in carrying, or

conducting, …… current. All metals, particularly silver, copper, gold, and aluminum are good ……. Substances with free electrons are called nonconductors or ……. because they do not carry electric charge and can be used to prevent …….from flowing where it is not wanted. Air, wood glass and plastic are insulators. A few……., like carbon, silicon and germanium, do not fall into either of these categories.

(From: English for Science by Zimmerman, 1989,p.8)

Appendix # 8

University of Constantine 01.
Department of Letters and English Language

Post-test (Post-test 3)

Read the text below and answer the questions that follow:

……..

The most common source of DC voltage is a battery. A battery is a collection of cells. A cell is the basic unit of voltage generation that creates electricity by chemical action. A battery is made up of two or more cells connected together. It consists of two metal electrodes immersed in a solution called an electrolyte. The chemical interaction between the metal electrodes and the electrolyte produces a separation of charges. This separation of charges results in an excess of electrons on one electrode (the - terminal of the cell) and a shortage of electrons on the other electrode (the + terminal of the cell). If a conductor is connected externally between the terminals, electrons will flow from - to +.

The cells can be separated into two categories, primary and secondary. Primary cells cannot be recharged. As the chemical action produces voltage, the electrodes and electrolyte are actually used up. At some point, no further chemical action is produced, and no voltage is generated. The cell must be discarded and replaced. Secondary cells, on the other hand, can be recharged. In these cells, the chemical action can be reversed by connecting an external DC voltage to the battery. This is called charging. Charging forces electrons into the battery, producing a reverse chemical action that rejuvenates the electrodes and the electrolyte. The cell can be discharged and charged repeatedly, giving it a very long life. The amount of current that can be drawn from a cell depends on its size and the quantity of the materials used. Large electrodes and electrolytes can produce more current, but the voltage stays the same; the type of material, not its volume, determines voltage. For example, a large D-size flashlight cell and a tiny AAA penlight cell are both made of alkaline material so their output voltages are both 1.5 volts. The D-cell, however, can produce more current and will have a longer life because it is larger. A greater current capacity can be obtained by simply connecting two or more cells in parallel. In a parallel connection, the cells are wired across one another, all + leads connected together, and all - leads connected together.

(Electronics Explained by Frenzel , 2010, p. 30)

1.Say True or False or Not Mentioned. Correct the False ones:
a. A cell is a basic unit of battery.
b. The separation of charges occurs when the metal electrodes interacts with each other.
c. The long life of a cell depends on how large it is.
d. Voltage is generated after the chemical force is produced.
e. Connecting cells together in parallel way result in a great current capacity.
f. Secondary cells should be replaced.

2. Choose the right answer for the following questions:
a. On which basis the cells are categorised in the text?
- The type of the electrolyte.
- The size and the quantity of materials.
- The possibility to be charged.

b. How the chemical action is produced?
- Connecting cells together.
- Spontaneous action during the interaction of electrodes and the solution.
- Charging primary cells.

c. How we can change a cell:
- By connecting an external Dc voltage .
- By replacing the cell.
- By giving it a very long life.

d. Select the most appropriate title to the text?
- Generating Voltage.
- Types of Cells.
- Voltage in Batteries.

3. Choose the right meaning of the words in bold from the following:

***** It consists of two metal electrodes **immersed** in a solution called an electrolyte.
a. increased b. neglected c. dissolved
* The chemical **interaction** between the metal electrodes and the electrolyte produces a separation of charges.
a. connection b. contact c. ignorance
* This separation of charges results in an **excess** of electrons on one electrode
a. overload b. shortage c. enough
* The cell must be **discarded** and replaced.
a. charged b. canceled c. obtained
* In these cells, the chemical action can be reverse d by connecting an **external** DC voltage to the battery.
a. exterior b. additional c. internal

4. Summarise the text in a diagram.

5. Fill in the gaps with the appropriate words from the List. Change the form of the word if necessary. Use each word only once.

types- which – attracted – called- known – groups- magnets – properties – are – magnetic - referred- is - allowed- recognised.

A magnet is a substance which attracts certain other substances. A substance …….. is attracted by a magnet can itself be made into a magnet. Generally speaking, there are three substances which are …….. by a magnet: iron, cobalt and nickel. Substances which are attracted by a magnet are …….. magnetic substances, and those which are not are …….. to as non-magnetic substances. Iron, cobalt and nickel ……magnetic substances. They are attracted by …….. and they can themselves be magnetized.

Mixtures of metals, or alloys, which contain a …….. substance generally have magnetic ……... Some alloys containing none of the above metals, however, are also magnetic. Certain alloys containing manganese, aluminium and copper belong to this class. They are magnetic, even though they contain no metal which is itself magnetic.

(From: English in Physical Science, by Allen and Widdowson,1974, p. 53)

Appendix # 9

University of Constantine 01.
Department of Letters and English Language

Unit One: Definition

Unit One: Definition

Entry test (45 Min.)

1. **Rhetorical functions:** Definition: Using English to Define.
2. **Grammar structure:**
    - Present tenses : Present simple
    - Realtive Clause
3. **Vocabulary :**
    - Some sentence patterns.
    - Non-technical vocabulary in context.
4. **Comprehension :** Getting general idea and extracting information

Exit test (Post-test 01) (60 Min.)

Entry Test (See Appendix # 4).

1. **Rhetorical function: Definition (35-40 min.)**

The text (261 words):

The Many Forms of Energy

Energy is the ability to work. When a hammer strikes a nail, it exerts a force on the nail that causes it to move. The movement of the hammer has the ability to do work and therefore has a form of energy that we call kinetic energy. Kinetic energy is the energy of motion.

An object may have energy not only because of its motion but also because of its position or shape. For example, when a watch spring is wound it is storing energy. When this energy is released, it will do the work of moving the hands of the watch. This form of energy is called potential energy. Potential energy is stored energy .Water in a dam is another example of potential energy.

There are many types of kinetic and potential energy, including chemical thermal mechanical, electrical, and nuclear energy. Chemical energy is potential energy that is stored in gasoline, food, and oil. Just as the watch spring needs to be released to do the work of moving the hands, the energy stored in food molecules needs to be released by enzymes or substances in the body, and the energy stored in gasoline must be released by the spark plug to do its work of propelling the car forward. Thermal energy may be defined as the kinetic energy of molecules. When a substance is heated, the molecules move faster which causes that substance to feel hot. Mechanical energy is energy related to the movement of objects. Electric energy is energy that is produced by electric charges.

(From: *English for Science* by Zimmerman, 1989, p. 68.)

1.1.Pre-reading: Warm up

This activity aims at attracting students' attention through activating student's prior knowledge and raising expectations about the text.

- The teacher writes the following words: Energy -of – Forms- The - Many and ask the students to reorder them to get the title of the text. "The Many Forms of Energy".
- What is Energy?

- Short discussion and analysis of the students' answers after recording them on the board.

1.2.While- reading :

This activity aims at guiding students in their reading and directing their attentions to specific aspects in the text.

- The teacher asks the following questions:

*What is the function of this text?

Giving information.

Giving directions.

Giving Instructions.

*What are these information? What do they represent?

- The teacher selects some of the students' answers which contain definitions, and writes them on the board.

Chemical energy is potential energy that is stored in gasoline, food, and oil.

The above sentence is a definition. A definition should be complete enough to include all the items in the category, yet narrow enough to eliminate items that do not belong.

*What is the formula of definition:

Term is/are……which ……..

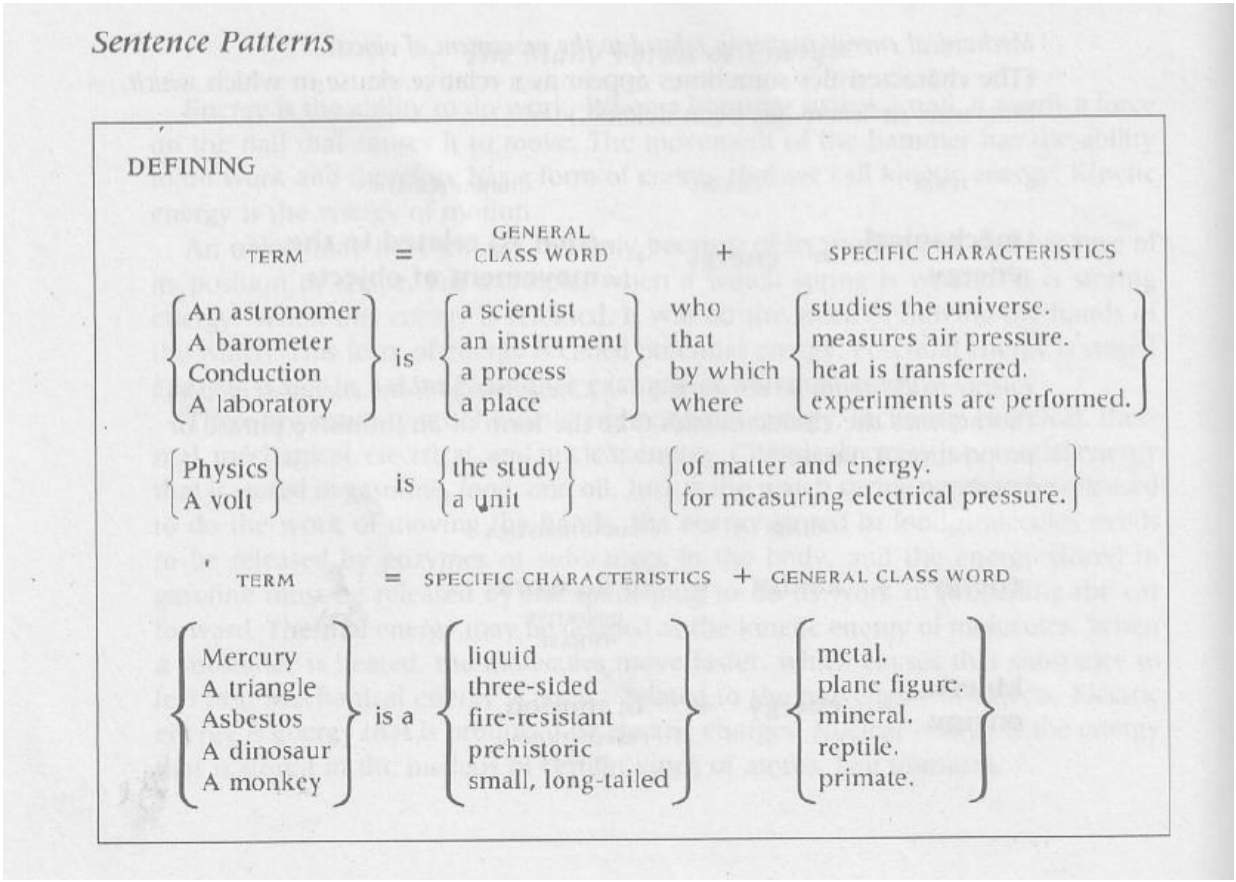
Term= class + characteristics (Frequently, appear as a relative clause beginning with which, that, who, or where)

Term		Class		Characteristic
Chemical energy	=	potential energy	+	that is stored in gasoline, food, and oil.

Term		Class		Characteristics
Energy	=	ability	+	to do work

*The teacher then asks students to extract other definitions from the text.

*Then, the following hand out is handed to students. They are asked to read and to give similar examples.



Sentence Patterns

DEFINING

TERM	=	GENERAL CLASS WORD		+	SPECIFIC CHARACTERISTICS
An astronomer	is	a scientist	who		studies the universe.
A barometer		an instrument	that		measures air pressure.
Conduction		a process	by which		heat is transferred.
A laboratory		a place	where		experiments are performed.
Physics	is	the study			of matter and energy.
A volt		a unit			for measuring electrical pressure.

TERM	=	SPECIFIC CHARACTERISTICS	+	GENERAL CLASS WORD
Mercury	is a	liquid		metal.
A triangle		three-sided		plane figure.
Asbestos		fire-resistant		mineral.
A dinosaur		prehistoric		reptile.
A monkey		small, long-tailed		primate.

From: *English for Science*, by Zimmerman, 1989, p. 70.

Note: when defining, remember the following:

The definite article, the, is usually not used with the term being defined because definitions are general statements. For example, we would define a giraffe not the giraffe For instance:

A monkey is a small, long-tailed primate. (in general), not
The monkey is a small, long-tailed primate. (a specific monkey).

Yet, expressing definition is different from generalisation. Consider the following example [idea taken from English in Physical Science by Widdowson (1974), p. 29]:

A barometer is an instrument which measures atmospheric pressure. (Definition)
Barometers measure atmospheric pressure. (Generalisation)
Chemical energy is potential energy that is stored in gasoline, food, and oil. (Definition)
Chemical energy is stored in gasoline, food, and oil. (Generalisation)

2.Grammatical Structures:

2.1. Present simple (25-30 min.)

Highlight a particular structure in the text by writing some sentences on the board and raising discussion with students.

Energy is the ability to work

Mechanicals energy is energy related to the movement of objects

1.Make students figure out what the structure is
2. Ask them about the use of such structure.
3. Remind the student's with the rules. (Supply them with handouts).

A Grammar

Present simple

Positive		
He/She	works/studies	at Oxford University.
I/You/We/They	work/study	
The water	flows	into the tank.
The electrons	flow	along the wire.

Negative				
I/We/They	do	not	work	on an oil platform.
He/She	does			

Question			
Where	do	you/they	work?
	does	he/she	

The present simple is used to talk about

(1) regular or routine events: *Tore goes home to Norway every four weeks.*

(2) job descriptions: *The chief electrician supervises a team of four electricians.*

(3) processes: *The water flows from the tank into the solar water panel.*

Present continuous

From: Technical English Level 2 by Bonamy, (2008), p.100

1. Present simple

Example	Meaning
*The newspaper **says** ...*	The "general" present.
*He likes Ann. She **drinks** coffee.*	Opinions and habits.
*She **lives** in Turin.*	The "status quo".
*He **leaves** for work at 7 o'clock.*	Habitual actions.
*Water **freezes** at 0°C.*	Scientific facts.

TYPICAL TIME MARKERS
(N.B. – Time markers may be implicit)

every day · usually · often · sometimes

From: Minimum Competence in Scientific English, by Balattes , Jans, Upjohn 2003, p.70.

2.2. Relative Clause (25-30 min.)

What is a relative clause?

A clause is part of sentence that contains a noun and a verb. Science definitions often include relative clauses contain the characteristics that distinguish an item from others in class.

The teacher reads and explains the following handout

Form

A *relative clause* is a type of *subordinate clause.*
Relative clauses begin with a relative pronoun.
Who and *which* are typical relative pronouns.
Blowholes are air or gas vents which carry off fumes from tunnels or underground passages.
[main clause] [relative pronoun] [subordinate clause]

There are two types of *relative clauses*:

defining relative clauses and *non-defining relative clauses*
Logistics is the business function which controls the movement of materials. (defining)
Our logistics department, which controls the movement of materials in the factory, is headed by Barry Perks. (non-defining)
A *defining relative clause* is written without commas; a *non-defining relative clause* is written in commas.

The table shows the range of relative pronouns

person	*who, whom, whose*	time	*when*
things	*which, that*	place	*where*

Uses

1 *Defining relative clauses* give information which is essential to understand the sentence.
The packing list is a document which describes the contents of each package.
The clause *which describes the contents of each package* identifies the document; without this information, the sentence has a different meaning.
A haulier is a company or person who specializes in transporting goods by truck.
The clause *who specializes in transporting goods by truck* identifies the company or person.

2 *Non-defining relative clauses* give additional, non-essential information.
The packing list, which describes the contents of each package, is sent with the goods.
The clause *which describes the contents of each package* gives additional information; we can still identify the packing list without this information.
The mine, which has extracted diamonds since the 19th century, will be closed in two years.
The clause *which has extracted diamonds since the 19th century* gives additional information.

(From: Technical English: Grammar and Vocabulary by Brieger and Pohl, 2002 , p p.88 – 89).

3.Vocabulary in Context

1. Underline the unfamiliar words.
2. From the underlined words, what are the key words for understanding the text?
3. Guessing the meaning of non-technical vocabulary in bold from context.

Choose the right meaning of the words in bold from the following:

- Energy is the **ability** to work.
  a. power b. talent c. capacity
- Mechanical energy is energy **related** to the movement of objects.
  a. dissimilar b. linked c. affected.
- The molecules move faster which causes that **substance** to feel hot
  a. material b. subject c. matter
- Chemical energy is **potential** energy that is stored in gasoline, food, and oil.
  a. possessed b. active c. latent
- The energy stored in gasoline must be released by the spark plug to do its work of propelling the car **forward**.
  a. backward b. further c. before

3. Post- reading : Using it

Post-reading activities encourage students to reflect upon what they have read. For the information to stay with the students, they need to go beyond simply reading it to using it.

- Extract all definitions from the text and analyse them. By underlining the general class once and the specific characteristic twice.

- How many relative clauses are there in the text?
- Ask students to do the following exercise:

Exercise 01: Choose the appropriate relative pronoun in each of the following sentences (from (From: Technical English: Grammar and Vocabulary by Brieger and Pohl, 2006 , p .89).

1.A load-bearing wall is a wall that/where supports a vertical load as well as its own weight.
2. An architect is someone whose/who draws up plans for buildings and other structures.
3. An unheated building, a cellar or a basement are examples of places which/where are often damp.
4. Manufacturing takes place in factories when/where finished products are made.
5. Marconi was the scientist who/whom first received signals across the Atlantic.
6. You are invited to attend the meeting on Tuesday which/when details of the project will be discussed.

Exercice 02: Use the information in brackets to complete the following sentences. For example: (The manufacturers provided some information.)
We have used the information that .....
We have used the information that the manufacturers provided.
1. (The assembly line produces car parts.)
They have automated the assembly line that……
2. (Water is stored in a tank.)
The water tank where…… is underground.
3.(Circuits can store large amounts of information.)
Computers contain many circuits which……
4.(WC. Rontgen discovered X-rays by accident.)
X-rays have been used since 1895 when……
5. (Faraday was born in the south of England.)
Faraday, who……., developed the process of electromagnetic induction.
6. (The manager's signature appears on the document.)
The manager whose…….....is responsible for purchasing.
7.(Several people work in this area.)
Everyone who……. is responsible for regular maintenance of the machinery.

Exercise 03: Correcting the Entry Test 01.

Practice: Language and Reading Comprehension

Passage 01

Silent Reading (20-25 min.): Instructions for students:

1. Have a quick look on the text at hand (30 sec.). The teacher asks students to describe the text format (title, length, number of paragraphs, tables, charts, diagrams, reference).
2. First reading: Read the text quickly (2 min.). The teacher asks students about the main idea of the text and writes their suggestions on the board.
2. Second reading: read carefully (20 min.) and answer the comprehension questions.

……..

Electronics is a branch of engineering and physics. It deals with the emission, behaviour, and effects of electrons for the generation, transmission, reception, and storage of information. This information can be audio signals in a radio, images (video signals) on a television screen, or numbers and other data in a computer. Electronic systems are important in communication, entertainment, and control systems.

Electronic circuits consist of interconnections of electronic components, at the heart of which are semiconductors. Transistors, which are made of silicon or germanium, are made from semiconductors. Commercial products range from cellular radiotelephone systems and video cassette recorders to high-performance supercomputers and sophisticated weapons systems. In industry, electronic devices have led to dramatic improvements in productivity and quality. For example, computer-aided design tools facilitate the design of complex parts, such as aircraft wings, or intricate structures, such as integrated circuits.

(From Technical English; Grammar and Vocabulary by Breiger & Phol, 2004 p. 38)

I. Language Mastery:

1. Find in the text definition.
2. Identify the term, the cases, and the feature in every definition.
3.Transform the definitions to generalisation if possible.
4. How many relative clauses are there in the text?

II. Comprehension questions:

1. Say True or False and correct the false ones:

a. The branch of electronics is based on the study of electrons.
b. Electronics brought remarkable development in industry.
c. Semiconductor devices are made primarily of silicon.
d. Information transmitted can take different forms.
e. Transistors are important electronic devices that made semiconductors.

2. Answer the following questions:

a. What is an electronic circuit?
b. What is the role of semiconductors?
c. Give a title to the text?

3. What do the underlined words in the text words refer to?

4.Vocabulary: (10-15 min.)

a. Underline the unfamiliar words.

b. From the underlined words, what are the key words for understanding the text?

c. Guessing the meaning of non-technical vocabulary in bold from context.

- Electronics is a **branch** of engineering and physics.

a. division. b. arm. c. discipline.

- It deals with the **emission** of electrons.

a. holding. b. discharge c. release

- Electronic circuits consist of interconnections of electronic **components**.

a. element. b. ingredient c. parts.

- Electronic devices have led to **impressive** improvements.

a. remarkable b. exciting c. boring

- Computer-aided design **tools** facilitate the design of complex parts.

a.machine. b. instrument c. weapon.

- Commercial products **range** from cellular radiotelephone systems and video cassette recorders to high-performance supercomputers and sophisticated weapons.

a.collection. b. variety c. rank.

5.Summarise the text in a diagram of your choice.

Passage 02

Silent Reading (20-25 min.): Instructions for students:

1. Have a quick look on the text at hand (30 sec.). The teacher asks students to describe the text format (title, length, number of paragraphs, tables, charts, diagrams, reference).
2. First reading: Read the text quickly (2 min.). The teacher asks students about the main idea of the text and writes their suggestions on the board.
2. Second reading: read carefully (20 min.) and answer the comprehension questions.

……

Magnetism is an invisible force that has the power to attract pieces of iron, or alloys of iron such as steel. Iron, steel, and the metals nickel and cobalt are called magnetic materials because they can be magnetized to generate a magnetic field, or they support the development and passage of a magnetic field. Magnets are pieces of such materials

that exhibit this force. Magnetism has no effect on nonmagnetic materials such as other metals (aluminum, brass, etc.), or on objects made of wood, plastic, or glass.

You have no doubt experienced the effects of magnetism yourself. You may have played with a horseshoe magnet as a kid, or used bar magnets like the one in a school lab. And you most likely have used flat magnets to hold paper notes on your refrigerator or file cabinet. These are called permanent magnets because they retain their magnetic force indefinitely.

A magnet is surrounded by an invisible magnetic force field made up of magnetic lines of force or flux lines. These flux lines flow out of one end of the magnet, the north (N) pole, and into the other end, the south (S) pole. The ends of the magnet are the points of the heaviest concentration of the magnetic field. The basic law of magnetism follows: opposite poles attract, and like poles repel. When you get two permanent magnets together, the north and south poles will attract one another. On the other hand, two north poles will repel one another. Two south poles will also physically push away from one another. Permanent magnets are used in a variety of electrical and electronic equipment. Their most common use is in motors, where the attraction and repulsion of magnets create rotary motion.

(From: Electronics Explained by Frenzel, 2010, pp.20- 21).

I. Language Mastery:

1. Find in the text definition.
2. Identify the term, the cases, and the feature in every definition.
3.Transform the definitions to generalisation if possible.
4. How many relative clauses are there in the text?

II. Comprehension questions:

1.Say True or False and correct the false ones:

a. Magnetic materials have a magnetic power.
b. Magnet is an example of nonmagnetic materials.
c. Wood is a magnetic material.
d. Magnets attract each other from all the sides.
e. The magnetic field is equally distributed over the magnets.

2. Answer the following questions:

- What is a magnetic field?
- What is the use of magnets?
- Explain how magnets attract each other?

3. What do the underlined words in the text words refer to?

4.Vocabulary: (10-15 min.)

a. Underline the unfamiliar words.

b. From the underlined words, what are the key words for understanding the text?
c. Guessing the meaning of non-technical vocabulary in bold from context.

- Nickel and cobalt are called magnetic **materials** because they can be magnetized.
  a. objects b. substances c. forms
- Magnetism has no **effect** on nonmagnetic materials such as other metals.
  a. influence b. cause c. result
- These are called **permanent** magnets because they retain their magnetic force indefinitely.
  a. stable b. sure c. lasting
- These flux lines **flow out** of one end of the magnet, the north (N) pole, and into the other end, the south (S) pole.
  a. expand b. leak c. run off
- Their most common use is in motors, where the attraction and **repulsion** of magnets create rotary motion.
  a. magnetism b. pushing away c. attraction

5.Summarise the text in a diagram of your choice.

Appendix # 10

University of Constantine 01.
Department of Letters and English Language

Unit Two: Classification

Unit Two: Classification

Entry test (45 Min.)

1. **Rhetorical functions:** Classification: Using English to Classify.
2. **Grammar structure:**
   - Passive/ Active Voice.
3. **Vocabulary :**
   - Some sentence patterns.
   - Non-technical vocabulary in context.
4. **Comprehension :** Getting general idea and extracting information

Exit test (Post-test 01) (60 Min.)

Entry Test (See Appendix # 6).

1. **Rhetorical function: Classification (35-40 min.)**

The text (300 words):

The Nature of Matter

All matter may be classified as solid, liquid, or gas. Solids are firm and have a definite form, rubber, wood, glass, iron, cotton and sand are all classified as solids. A considerable force would be needed to change the shape or volume of an iron bar, for example, because the atoms or molecules of a solid are densely packed and have very little freedom of movement.

Solids may be further divided into two classes: crystalline and amorphous. Rocks, wood, paper, and cotton are crystalline solids. Crystalline solids are made up of atoms arranged in a definite pattern. When these solids are heated, the change to a liquid, known as melting, is sharp and clear. Amorphous substances include rubber, glass, and sulfur. In these substances, the pattern of the atoms is not orderly, and when heated, they gradually soften.

Liquids, on the other hand, are not rigid. If water, milk, or oil is poured on a table it will flow over the surface. The atoms or molecules of liquids attract each other and thereby enable liquids to flow. But these atoms are loosely structured and not keep their shape. Therefore, a liquid will take the shape of any container in which it is poured. However, liquids have a definite volume: a quart of milk cannot fit in a pint container.

Gases, such as air, oxygen, carbon dioxide, have no fixed shape or volume of their own. They diffuse or spread out to fill any container. If water is put into a tire, it will run to the bottom; if air is put into a tire, it fills the whole space inside the tire. The atoms or molecules of gazes are widely spaced and move very rapidly. They either compress or expand to adapt to any
area.

(From: *English for Science* by Zimmerman, 1989, pp. 3-4)

1.1.Pre-reading: Warm up

This activity aims at attracting students' attention through activating their prior knowledge and raising expectations about the text.

- The teacher writes the following words: Energy -of – Forms- The - Many and ask the students to reorder them to get the title of the text. "The Many Forms of Energy".
- What is Energy?
- Short discussion and analysis of the students' answers after recording them on the board.

1.2.While- reading :

This activity aims at guiding students in their reading and directing their attentions to specific aspects in the text. The teacher asks the following question:

- What is the function of this text?

Giving information.
Giving directions.
Giving Instructions.

- What are these information about?

* The teacher selects some of the students' answers which contain classification, and writes them on the board.

All matter may be classified as solid, liquid, or gas.
Solids may be further divided into two classes: crystalline and amorphous.

*What is the formula of classification:

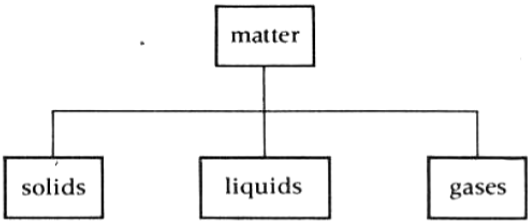
A classification includes:

1. A general class.
2. a specific item or items, and
3. a basis for classification, which is frequently not stated because it is understood or explained elsewhere.

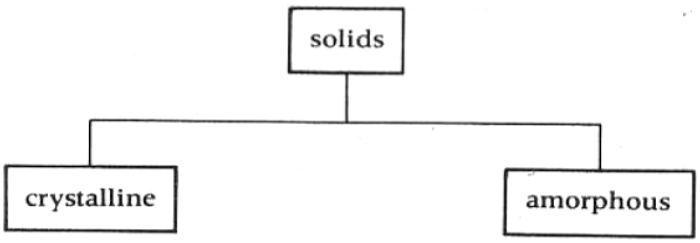
*The teacher then asks students to extract other classifications exist in the text.

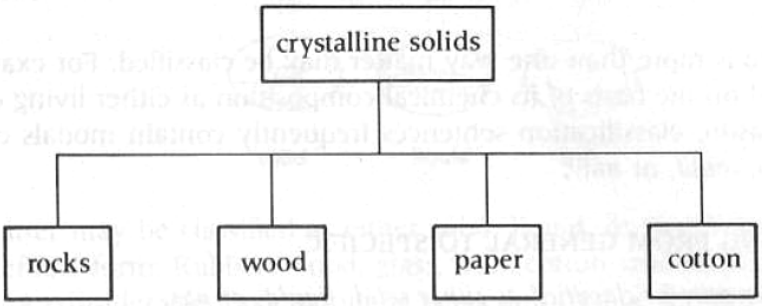
CLASSIFYING FROM GENERAL TO SPECIFIC

All matter may be classified as either solid, liquid, or gas.
(Note that all matter is included in these three subdivisions.



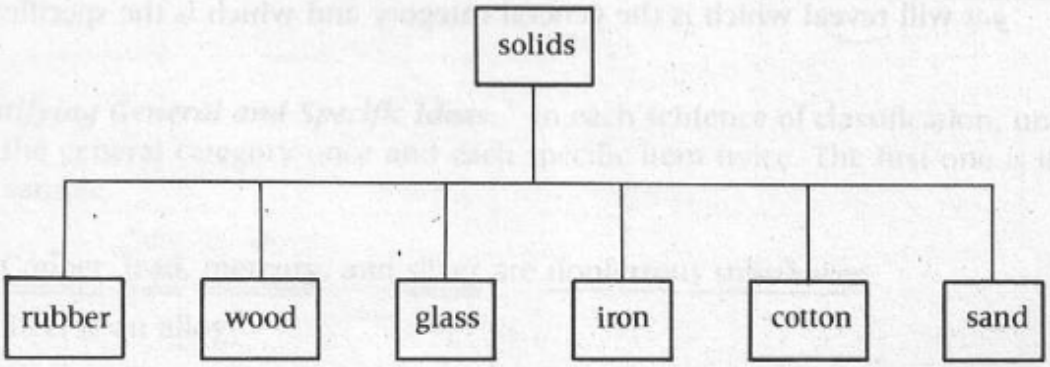
Solids may be further divided into two classes: crystalline and amorphous.





CLASSIFYING FROM SPECIFIC TO GENERAL

Rubber, wood, glass, iron, cotton, and sand are all classified as solids.
(When classifying from specific to general, the specific items do not necessarily cover all the subdivisions of the general category; that is, there are obviously other solids that are not included here.)



*Then, the following hand out is handed to students. They are asked to read and to give similar examples.

CLASSIFYING FROM GENERAL TO SPECIFIC

Matter { is/are / may be / can be / could be } { classified / grouped / divided / arranged / categorized } into { divisions. / groups. / types. / classes. / categories. / classifications. }

{ classified / categorized / classed / grouped } as { solid, liquid, or gas. }

There are three { types / kinds / classes / categories } of matter.

CLASSIFYING FROM SPECIFIC TO GENERAL

Oxygen { may be / can be / could be / is/are } { classified / classed / categorized } as a gas.

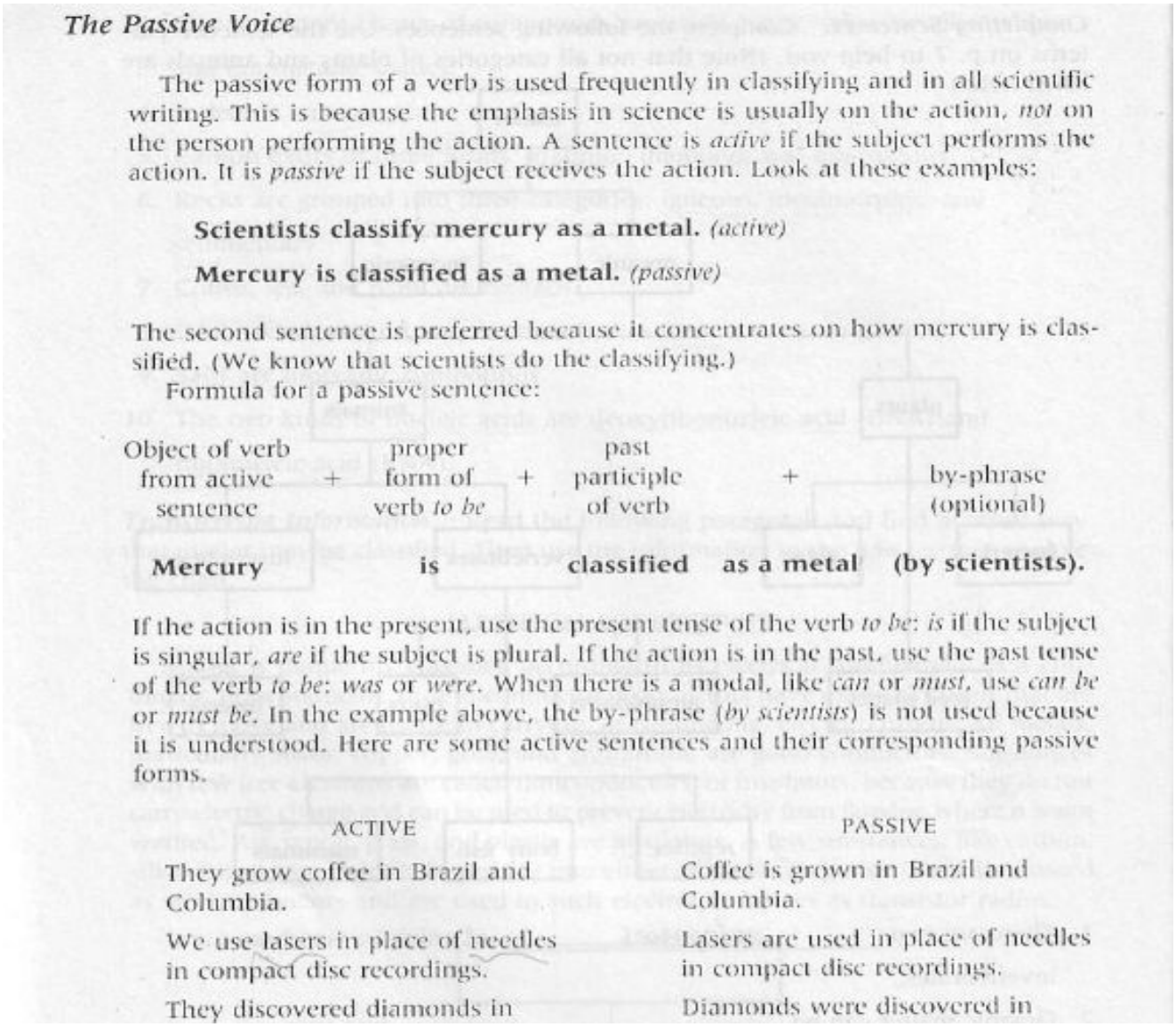
Oxygen is { an example of a / a type of / a kind of / a form of / a } gas.

Note: These sentence patterns are only samples, not a comprehensive list of all possible patterns.

(From: *English for Science* by Zimmerman, 1989, p.07)

2. Grammatical structure: Passive Form

1. Highlight a particular structure in the text by writing some sentences on the board and raising discussion with students. Make students figure out what the structure is?
A considerable force would be needed to change the shape or volume of an iron bar.
Solids may be further divided into two classes.
Crystalline solids are made up of atoms arranged in a definite pattern.
2. Ask them about the use of such a structure?
3. Remind students with the rules. (Supply them with handouts).



The Passive Voice

The passive form of a verb is used frequently in classifying and in all scientific writing. This is because the emphasis in science is usually on the action, *not* on the person performing the action. A sentence is *active* if the subject performs the action. It is *passive* if the subject receives the action. Look at these examples:

Scientists classify mercury as a metal. *(active)*

Mercury is classified as a metal. *(passive)*

The second sentence is preferred because it concentrates on how mercury is classified. (We know that scientists do the classifying.)

Formula for a passive sentence:

Object of verb from active sentence	+	proper form of verb *to be*	+	past participle of verb	+	by-phrase (optional)
Mercury		**is**		**classified**	**as a metal**	**(by scientists).**

If the action is in the present, use the present tense of the verb *to be*: *is* if the subject is singular, *are* if the subject is plural. If the action is in the past, use the past tense of the verb *to be*: *was* or *were*. When there is a modal, like *can* or *must*, use *can be* or *must be*. In the example above, the by-phrase (*by scientists*) is not used because it is understood. Here are some active sentences and their corresponding passive forms.

ACTIVE	PASSIVE
They grow coffee in Brazil and Columbia.	Coffee is grown in Brazil and Columbia.
We use lasers in place of needles in compact disc recordings.	Lasers are used in place of needles in compact disc recordings.
They discovered diamonds in	Diamonds were discovered in

From English for Science by Zimmerman, 1989, p. 10

The Passive

The first two readings in this unit contain the following sentences:

> "These [instructions] **are** permanently **remembered** by the machine and **cannot be altered** or **added to**."
>
> "The computer **is instructed** to distinguish two kinds of numbers. . . . It **is** also **told** how to multiply. . . ."

The words in bold type are verbs in the ***passive*** form. The form of the passive is **be + PAST PARTICIPLE** or **MODAL + be + PAST PARTICIPLE**. Notice that adverbs, such as *permanently* and *also*, appear between ***be*** and the **past participle**. How is the form of passive sentences different from the form of active sentences? When is the passive form used?

FORM: The object of an active sentence becomes the subject of a passive sentence. The subject of an active sentence follows the preposition *by* in the passive sentence; it is called the **agent** in the passive sentence. The two sentence forms have essentially the same meaning.

For example,

> **Active:** The machine permanently ***remembers*** these instructions.
>
> **Passive:** These instructions ***are*** permanently ***remembered*** *by* the machine.

Often, the *by*-phrase is not used in a passive sentence. This is because the exact agent is not known or is not important. These examples show the unnecessary agent in parentheses:

> These instructions ***cannot be altered*** or ***added to*** (by people).
>
> The computer ***is instructed*** (by someone) to distinguish two kinds of numbers.
>
> It ***is*** also ***told*** (by a programmer) how to multiply.

(From Teach Talk Better English through Reading Science by F.Eskey, 2005, p. 11)

Form

Every active sentence has at least two parts:
a subject [1] + an active verb form [2]
We normally produce a preliminary analysis.
[1] [2]
Every passive sentence has at least two parts:
a subject [1] + a passive verb form [2]
A preliminary analysis is normally produced.
[1] [2]

(From: Technical English: Grammar and Vocabulary by Brieger and Pohl, 2006 , p 76).

3. Vocabulary in Context:

1. Underline the unfamiliar words.
2. From the underlined words, what are the key words for understanding the text?
3. Guessing the meaning of non-technical vocabulary in bold from context.

- Crystalline solids are made up of atoms **arranged** in a definite pattern.
  a. organised. b. ruled. c. managed
- They **diffuse** to fill any container.
  a. free. b. circulate c. release
- The atoms or molecules of liquids attract each other and **thereby** enable liquids to low.
  a. finally. b. thus c. because.
- They either **expand** to adapt any area.
  a. develop b. compress c. enlarge
- In these substances, the **pattern** of the atoms is not orderly.
  a. arrangement b. range c. series
- Everything around us **consists of** matter.
  a. made of. b. variety c. composed of.

3.Post- reading : Using it

Post-reading activities encourage students to reflect upon what they have read. For the information to stay with the students, they need to go beyond simply reading it to using it.

- Extract all definitions from the text and analyse them. By underlining the general class once and the specific characteristic twice.
- How many relative clauses are there in the text?
- Ask students to do the following exercise:

Exercise 01: Change the following sentences into the passive voice.
- A repeater boosts the electrical signal so that longer cables can be used.
- Manufacturers choose plastic container s for many different reasons.
- For our research studies a preliminary analysis is normally produced.
-The chemicals in this process are toxic: safety clothing must be worn.

Exercise 02: Change the following sentences into the active voice.

- Nearly all paper can be recycled if it is sorted and contaminants are removed.
- In the meantime we will investigate your claims further.
- The electronics industry creates, designs, produces, and sells devices.
- Electronic devices have improved our lives by providing high quality communication.

Exercise 03: Correcting the Entry Test.

Language and Reading and Comprehension

Passage 01

Silent Reading (20-25 min.): Instructions for students:
1. Have a quick look on the text at hand (30 sec.). The teacher asks students to describe the text format (title, length, number of paragraphs, tables, charts, diagrams, reference).
2. First reading: Read the text quickly (2 min.). The teacher asks students about the main idea of the text and writes their suggestions on the board.
2. Second reading: read carefully (20 min.) and answer the comprehension questions.

……..

Electricity is the movement of charged particles, usually electrons, from one place to another. Materials that electricity can move through easily are called conductors. Most metals, such as iron, copper and aluminum are good conductors of electricity. Other materials, such as rubber, wood and glass, block the flow of electricity. Materials which prevent the flow of electricity are called insulators. Electrical cords are usually made with both conductors and insulators. Electricity flows through a conductor in the center of the cord. A layer of insulation surrounds the conductor and prevents the electricity from 'leaking' out.

Objects usually have equal numbers of positive and negative charges, but it isn't too hard to temporarily create an imbalance. One way scientists can create an imbalance is with a machine called a Van de Graaff generator. It creates a large static charge by placing electrons on a metal dome using a motor and a big rubber band. Since like charges repel the electrons push away from each other as they collect on the dome. Eventually, too many electrons are placed on the dome and they leap off, creating a spark that looks like a bolt of lightning.

(From: http://education.jlab.org/reading/electrostatics.html)

I. Language Mastery:

1. Identify the type of classification used in the text.
2. Find in the text a sentence that includes classification? Underline the general category once and every specific class twice.
3. Are there any passive sentences in the text? How many? Underline them. Choose one passive sentence and turn it into an active one?
4. Find in the text an active sentence and turn it into a passive one?

II. Comprehension questions:

1. Say True, False or Not Mentioned. Correct the false ones:
   a. Electricity is the movement of electrons from one place to another.
   b. Insulators block the flow of electricity.

c. Conductors prevent electricity from leaking out.
d. Electricity does not flow in electrical cords.
e. All objects have equal numbers of negative and positive charges.

2. Answer the following questions:
- What is a conductor?
- How the electrical cords are structured?
- Give a title to the text?

3.Vocabulary:
1. Underline the familiar words and employ them in sentences.
2. Choose the right meaning of the words in bold from the following:
- Materials that electricity can **move through** easily are called conductors
a.go across b. pass over c. travel
- Other materials, such as rubber, wood and glass, block the **flow** of electricity.
a. flood b.stream c. current
- Materials which **prevent** the flow of electricity are called insulators.
a.avoid b.avert c. stop
- It prevents the electricity from **leaking out.**
a.seep out b. bleed c. escape

- It isn't too hard to **temporarily** create an imbalance.
a. For the moment b.provisionally c. permanently

4.Summarise the first paragraph in a diagram.

Passage 02

Silent Reading (20-25 min.): Instructions for students:

1. Have a quick look on the text at hand (30 sec.). The teacher asks students to describe the text format (title, length, number of paragraphs, tables, charts, diagrams, reference).
2. First reading: Read the text quickly (2 min.). The teacher asks students about the main idea of the text and writes their suggestions on the board.
2. Second reading: read carefully (20 min.) and answer the comprehension questions.

Conductors, Insulators, and Semiconductors

A conductor is a material that has many electrons easily freed up by an external voltage. Current flows through conductors easily. They have what we call low resistance. Most good conductors are metals like copper, silver, or aluminum, with

loosely bound electrons that can be freed by an external voltage to create current flow. Copper wire is the most commonly used conductor because of its low cost and its ability to be formed into many different shapes and sizes. Most metals are conductors but so is salt water.

Insulators are just the opposite of conductors. These are usually compounds in which the electrons are tightly bound together with the nuclei of the atoms. Even with lots of voltage applied, the electrons are hard to strip away to make current. Insulators keep current from flowing. Some common insulator materials are glass, ceramic, and plastics.

A third category of material is called semiconductor. It is a material that can be changed to make it a good conductor or a good insulator or anything in between. Semiconductors are used to make the transistors, diodes, and integrated circuits. The most common semiconductor is silicon. Others are germanium and carbon. Compounds such as gallium arsenide (GaAs), indium phosphide (InP), and silicon germanium (SiGe) are examples. Most integrated circuits (ICs) or chips are made of silicon.

(from Electronics Explained: the New System Approach to Learning Electronics, by Frenzel, 2010, p. 20)

I. Language Mastery:

1. Identify the type of classification used in the text.
2. Find in the text a sentence that includes classification? Underline the general category once and every specific class twice.
3. Are there any passive sentences in the text? How many? Underline them. Choose one passive sentence and turn it into an active one?
4. Find in the text an active sentence and turn it into a passive one?

II. Comprehension questions:

1. Say True, False or Not Mentioned. Correct the false ones:

a. Electricity is a kind of energy.
b. Atoms can make up things that we do not see.
c. Electrons can never be controlled.
d. Current flow is the movement of electrons.
e. Voltage comes from one source, which is the battery.
f. Electronics is about controlling electrons.

2. Choose the right answer for the following questions:

a. How electronics gets to the houses?
b. What is Voltage?
c. What is the role of the Integrated circuit?

3. Choose the right meaning of the words in bold from the following (05 points)

* Current **flows** through conductors easily.

a. moves b. runs c. circulates.

* The electrons are hard to **strip away** to make current.

a. remove b. take away c. keep away

* Copper wire is the most **commonly** used conductor.

a. lately b. seldom c. mostly

* Most metals are conductors but **so** is salt water

a. thus b. even c. and

* These are usually compounds in which the electrons are **tightly** bound together

a. regularly b. loosely c. firmly

4.Summarise the text in a diagram.

Appendix #11

University of Constantine 01
Department of Letters and English Language

Table A1

Experimental and Control Group Scores in the Pre-test

N°	Experimental Group						N°	Control Group					
	Dic	MC	GUS	IT	GF	AV		Dic	MC	GUS	IT	GF	AV
1	1,5	2	4	0,5	0,5	8,5	1	2	2	2	1,5	2	9,5
2	0,5	2	3	0	0,5	6	2	2,5	2	1	0,5	0	6
3	2,5	2	2	2	1	9,5	3	3	3	2	1,5	3	12,5
4	1	1	0	0,5	0,5	3	4	3	1	2	1,5	2	9,5
5	1,5	2	4	0	0,5	8	5	1,5	1	1	1,5	1	6
6	1,5	4	2	0,5	0	8	6	2	2	3	1,5	0	8,5
7	1	2	4	1,5	0,5	9	7	2,5	2	4	5	3	16,5
8	2	2	3	1	0	8	8	1	3	1	1,5	0	6,5
9	3	1,5	2	2	0	8,5	9	2,5	4	4	2	2	14,5
10	2	2	1	0,5	0,5	6	10	2	0	0	0	0	2
11	1	2	3	0,5	1	7,5	11	1,5	1	0	1	2	5,5
12	1,5	3	2	0,5	0	7	12	0,5	1	0	0	0	1,5
13	3	3	3	3,5	2	14,5	13	2,5	1	2	1	0	6,5
14	2	2	2	1,5	0,5	8	14	2,5	2	3	1,5	3	12
15	2,5	3	1	1,5	0,5	8,5	15	2	1	1	2	0	6
16	1,5	2	3	0,5	0	7	16	3	1	2	2	4	12
17	1,5	2	3	1,5	0	8	17	1	3	2	1,5	0	7,5
18	2,5	3	3	3,5	1,5	13,5	18	1,5	2	3	0	0	6,5
19	1,5	2	3	1,5	0	8	19	2,5	3	3	0	2	10,5
20	1,5	1	1	0	0,5	4	20	3	3	2	3,5	0	11,5
21	0	2	1	0,5	0,5	4	21	1,5	1	2	3	0	7,5
22	1,5	4	3	1	2	11,5	22	1	3	2	2,5	2	10,5
23	1	4	2	4	2	13	23	2,5	2	0	1	1	6,5
24	1,5	3	2	1	2,5	10	24	2,5	2	1	1,5	3	10
25	2	1	0	2	1,5	6,5	25	3	1	1	1	0	6
26	2,5	3	3	2,5	1,5	12,5	26	2,5	2	1	1	2	8,5
27	1,5	1	2	1	0,5	6	27	3	3	2	4,5	1	13,5
28	1	2	2	1,5	0,5	7	28	2	2	1	1,5	2	8,5
29	3	4	4	3	2	16	29	1,5	3	2	1,5	0,5	8,5
$\sum X_E$						247	$\sum X_C$						250,5
$\bar{x}_E$						8,51	$\bar{x}_C$						8,63

N: Number of subjects
$\bar{x}$: Mean
AV: Average
$\sum X$: Sum of scores
GF : Gap- filling

Dic : Dicotomous questions
MC: Multiple choice questions
GUS : Guesssing meaning from context
IT : Information transfer

Table A2

Experimental and Control Group Scores in the Exit Test (Post-test 1)

N°	Experimental Group						N°	Control Group					
	Dic	MC	GUS	IT	GF	AV		Dic	MC	GUS	IT	GF	AV
1	2,5	4	3	1	0	10,5	1	1,5	3	1	1,5	3	10
2	2	2	1	0,5	2	7,5	2	2,5	4	1	0,5	1	9
3	1,5	4	2	3,5	0,5	11,5	3	2	2	2	2	2	10
4	1	1	1	0,5	0,5	4	4	2	1	2	1,5	2	8,5
5	1,5	2	2	0,5	1,5	7,5	5	1	1	3	1,5	1	7,5
6	2,5	3	3	1,5	1	11	6	2,5	1	3	1,5	0,5	8,5
7	2	3	1	3	1	10	7	2,5	4	4	5	3	18,5
8	2	3	4	3,5	1,5	14	8	2	2	1	1,5	1	7,5
9	2	3	2	1	0,5	8,5	9	2	3	4	3,5	2	14,5
10	2,5	4	1	2	0	9,5	10	1,5	1	0	0	0,5	3
11	2	4	1	2,5	1	10,5	11	1	1	1	1	0	4
12	2	3	2	1,5	0,5	9	12	2	1	0	0	0,5	3,5
13	2,5	3	3	2,5	1,5	12,5	13	2	2	2	1	0	7
14	2	3	2	1,5	2	10,5	14	1,5	2	3	1,5	4	12
15	1	1	3	1	1,5	7,5	15	2	1	3	2	1	9
16	1	2	2	0	1	6	16	1	2	2	2	0,5	7,5
17	0,5	2	2	1	1,5	7	17	2	3	2	1,5	0	8,5
18	1,5	3	4	2,5	1,5	12,5	18	1,5	3	4	0	2	10,5
19	2	2	3	1,5	0,5	9	19	3	3	3	0	0	9
20	1	1	0	0,5	0,5	3	20	2	2	3	2,5	2	11,5
21	0,5	1	1	1	0,5	4	21	2	2	1	3	0	8
22	2	1	3	0	2	8	22	1,5	3	2	3,5	1	11
23	1,5	3	3	2	1,5	11	23	2	1	1	1	0	5
24	1,5	3	4	3	2,5	14	24	2,5	2	1	1,5	1	8
25	1,5	3	3	1,5	1	10	25	3	1	2	0,5	1,5	8
26	2,5	3	4	3	2	14,5	26	3	2	1	0,5	0,5	7
27	1,5	4	3	3	1	12,5	27	2	1	2	3	1	9
28	1,5	2	2	3	0,5	9	28	2	2	1	0,5	2	7,5
29	2	3	4	3,5	3,5	16	29	1,5	1	2	1,5	2	8
$\sum X_E$						280,5	$\sum X_c$						251
$\bar{x}_E$						9,67	$\bar{x}_c$						8,65

N: Number of subjects
$\bar{x}$: Mean
AV: Average
$\sum X$: Sum of scores
GF : Gap- filling

Dic : Dicotomous questions
MC: Multiple choice questions
GUS : Guesssing meaning from context
IT : Information transfer

Table A3

Experimental and Control Group Scores in the Exit test (Post-test 2)

N°	Experimental Group						N°	Control Group					
	Dic	MC	GUS	IT	GF	AV		Dic	MC	GUS	IT	GF	AV
1	1,5	3	1	0	0,5	6	1	2	1	1	2	1	7
2	1,5	3	4	1	1,5	11	2	2	2	2	1	2	9
3	2,5	1	5	3	2	13,5	3	1,5	2	3	2	2	10,5
4	1,5	1	2	0	0,5	5	4	2	1	1	1	1	6
5	2,5	2	5	0	2,5	12	5	1,5	1	1	1	2	6,5
6	1,5	1	2	3	1,5	9	6	1	2	1	2,5	1	7,5
7	1,5	2	4	4	2	13,5	7	1,5	4	4	3,5	2,5	15,5
8	1,5	1	2	3	2	9,5	8	2	1	2	1	2	8
9	3	2	4	4	3,5	16,5	9	3	2	4	1,5	3	13,5
10	2	1	3	4	3	13	10	0,5	1	0	1,5	0,5	3,5
11	2,5	3	2	4	2,5	14	11	1,5	1	2	1	1	6,5
12	2,5	2	3	3	3,5	14	12	1	1	0	1	1	4
13	2	2	4	3	2,5	13,5	13	1,5	2	2	1	1	7,5
14	2	2	2	1,5	3	10,5	14	2	2	3	3	4	14
15	1,5	1	2	2	0	6,5	15	1	1	2	2	1	7
16	1,5	3	4	0	1,5	10	16	1,5	2	3	2	1	9,5
17	1,5	3	1	3	2	10,5	17	1,5	2	0	3	0	6,5
18	2,5	4	3	4	2	15,5	18	2	2	2	2	2	10
19	1,5	2	1	4	1,5	10	19	1	3	2	1,5	0	7,5
20	0,5	1	1	0	0,5	3	20	2	3	1	2	1	9
21	1,5	1	1	1	0,5	5	21	2,5	2	3	0,5	1	9
22	2	2	1	3	2	10	22	1,5	4	3	1	2	11,5
23	2,5	3	2	2,5	2	12	23	1,5	1	1	1	0,5	5
24	1,5	3	1	1,5	1,5	8,5	24	2	1	2	2	0	7
25	1	3	3	3	1,5	11,5	25	2	3	2	1	1	9
26	2	2	4	2	3	13	26	1,5	1	4	1	1	8,5
27	2	3	2	4	1,5	12,5	27	1,5	2	3	3	3	12,5
28	2	2	1	4	1,5	10,5	28	1	3	3	1,5	2	10,5
29	3	3	4	3,5	3,5	17	29	1,5	2	2	3	2	10,5
$\sum X_E$						316,5	$\sum Xc$						252
$\bar{x}_E$						10,91	$\bar{x}_C$						8,62

N: Number of subjects
$\bar{x}$: Mean
AV: Average
$\sum X$: Sum of scores
GF : Gap- filling

Dic : Dicotomous questions
MC: Multiple choice questions
GUS : Guesssing meaning from context
IT : Information transfer

Table A4

Experimental and Control Groups' Scores in the Post-test 03

N°	Experimental Group						N°	Control Group					
	Dic	MC	GUS	IT	GF	AV		Dic	MC	GUS	IT	GF	AV
1	2	2	2	2	1	9	1	2,5	2	1	2,5	1	9
2	2	3	3	2,5	1	11,5	2	2	3	2	1	0	8
3	2	3	2	2,5	1,5	11	3	2	1	3	2	2	10
4	1	2	1	2	1	7	4	2	2	1	1	1	7
5	1	2	2	3	2,5	10,5	5	2	2	3	1	1	9
6	3	2	4	2	2	13	6	1,5	2	1	1,5	1	7
7	2	2	2	3,5	1,5	11	7	3	3	5	4	4	19
8	2	2	2	1	2,5	9,5	8	1,5	3	2	1	1	8,5
9	2,5	3	2	1	3,5	12	9	2,5	4	2	3,5	3	15
10	2,5	2	4	3	3	14,5	10	1,5	2	2	1	0,5	7
11	2	2	2	2,5	2	10,5	11	2	1	2	1	0,5	6,5
12	2	2	4	2	1,5	11,5	12	0,5	1	1	0,5	0,5	3,5
13	2,5	3	4	3	2,5	15	13	2	1	1	1	1	6
14	1,5	2	1	1	2	7,5	14	3	2	3	3	3	14
15	3	2	4	3	0,5	12,5	15	1	2	2	0	2	7
16	1,5	2	3	2,5	1,5	10,5	16	2	2	2	2	1	9
17	2,5	3	1	2,5	2,5	11,5	17	2	1	0	3	0	6
18	3	2	4	3	1,5	13,5	18	2	2	2	2	1	9
19	2	2	1	1	2	8	19	1	2	3	1,5	1	8,5
20	1	1	2	2	0,5	6,5	20	2	3	3	2	1	11
21	2,5	2	2	2	1	9,5	21	2	3	1	0,5	1	7,5
22	1	3	4	3	2	13	22	0	1	3	0,5	0,5	5
23	1,5	3	3	2,5	2,5	12,5	23	1,5	1	2	1	1,5	7
24	1,5	2	3	2	2,5	11	24	2	2	4	2	1	11
25	2,5	2	3	2,5	1,5	11,5	25	2	2	3	3	0	10
26	2,5	3	4	3	2,5	15	26	1	3	2	1	1	8
27	1,5	2	1	0	2	6,5	27	2	3	3	3	2	13
28	2	2	2	1,5	1	8,5	28	1	1	2	1,5	2	7,5
29	3	3	4	2	3	15	29	1,5	2	1	2	2	8,5
$\sum X_E$						318,5	$\sum X_c$						257
$\bar{x}_E$						10,98	$\bar{x}_c$						8,87

N: Number of subjects
$\bar{x}$: Mean
AV: Average
$\sum X$: Sum of scores
GF : Gap- filling

Dic : Dicotomous questions
MC: Multiple choice questions
GUS : Guesssing meaning from context
IT : Information transfer

Appendix # 12

University of Constantine 01
Department of Letters and English Language

Table B1
Students' Scores in Activity One

N	Experimental Group					N	Control Group				
	Pre-test	Post-test 01	Post-test 02	Post-test 03	Av		Pre-test	Post-test 01	Post-test 02	Post-test 03	Av
01	1,5	2,5	1,5	2	2	01	2	1,5	2	2,5	2
02	0,5	2	1,5	2	1,83	02	2,5	2,5	2	2	2,16
03	2,5	1,5	2,5	2	2	03	3	2	1,5	2	1,83
04	1	1	1,5	1	1,16	04	3	2	2	2	2
05	1,5	1,5	2,5	1	1,66	05	1,5	1	1,5	2	1,5
06	1,5	2,5	1,5	3	2,33	06	2	2,5	1	1,5	1,66
07	1	2	1,5	2	1,83	07	2,5	2,5	1,5	3	2,33
08	2	2	1,5	2	1,83	08	1	2	2	1,5	1,83
09	3	2	3	2,5	2,5	09	2,5	2	3	2,5	2,5
10	2	2,5	2	2,5	2,33	10	2	1,5	0,5	1,5	1,16
11	1	2	2,5	2	2,16	11	1,5	1	1,5	2	1,5
12	1,5	2	2,5	2	2,16	12	0,5	2	1	0,5	1,16
13	3	2,5	2	2,5	2,33	13	2,5	2	1,5	2	1,83
14	2	2	2	1,5	1,83	14	2,5	1,5	2	3	2,16
15	2,5	1	1,5	3	1,83	15	2	2	1	1	1,33
16	1,5	1	1,5	1,5	1,33	16	3	1	1,5	2	1,5
17	1,5	0,5	1,5	2,5	1,5	17	1	2	1,5	2	1,83
18	2,5	1,5	2,5	3	2,33	18	1,5	1,5	2	2	1,83
19	1,5	2	1,5	2	1,83	19	2,5	3	1	1	1,6
20	1,5	1	0,5	1	0,83	20	3	2	2	2	2
21	0	0,5	1,5	2,5	1,5	21	1,5	2	2,5	2	2,16
22	1,5	2	2	1	1,66	22	1	1,5	1,5	0	1
23	1	1,5	2,5	1,5	1,83	23	2,5	2	1,5	1,5	1,66
24	1,5	1,5	1,5	1,5	1,5	24	2,5	2,5	2	2	2,16
25	2	1,5	1	2,5	1,66	25	3	3	2	2	2,33
26	2,5	2,5	2	2,5	2,33	26	2,5	3	1,5	1	1,83
27	1,5	1,5	2	1,5	1,66	27	3	2	1,5	2	1,83
28	1	1,5	2	2	1,83	28	2	2	1	1	1,33
29	3	2	3	3	2,66	29	1,5	1,5	1,5	1,5	1,5
∑XE	49	49,5	54,5	59	54,33	∑XE	61,5	57	47	51	51,66
XE	1,68	1,70	1,87	2,03	1,87	XE	2,12	1,96	1,62	1,75	1,78

Table B2
Students' Scores in Activity Two

N	Experimental Group					N	Control Group				
	Pre-test	Post-test 01	Post-test 02	Post-test 03	Av		Pre-test	Post-test 01	Post-test 02	Post-test 03	Av
01	2	4	3	2	3	01	2	3	1	2	2
02	2	2	3	3	2,66	02	2	4	2	3	3
03	2	4	1	3	2,66	03	3	2	2	1	1,66
04	1	1	1	2	1,33	04	1	1	1	2	1,33
05	2	2	2	2	2	05	1	1	1	2	1,33
06	4	3	1	2	2	06	2	1	2	2	1,66
07	2	3	2	2	2,33	07	2	4	4	3	3,66
08	2	3	1	2	2	08	3	2	1	3	2
09	1,5	3	2	3	2,66	09	4	3	2	4	3
10	2	4	1	2	2,33	10	0	1	1	2	1,33
11	2	4	3	2	3	11	1	1	1	1	1
12	3	3	2	2	2,33	12	1	1	1	1	1
13	3	3	2	3	2,66	13	1	2	2	1	1,66
14	2	3	2	2	2,33	14	2	2	2	2	2
15	3	1	1	2	1,33	15	1	1	1	2	1,33
16	2	2	3	2	2,33	16	1	2	2	2	2
17	2	2	3	3	2,66	17	3	3	2	1	2
18	3	3	4	2	3	18	2	3	2	2	2,33
19	2	2	2	2	2	19	3	3	3	2	2,66
20	1	1	1	1	1	20	3	2	3	3	32,66
21	2	1	1	2	1,33	21	1	2	2	3	2,33
22	4	1	2	3	2	22	3	3	4	1	2,66
23	4	3	3	3	3	23	2	1	1	1	1
24	3	3	3	2	2,66	24	2	2	1	2	1,66
25	1	3	3	2	2,66	25	1	1	3	2	2
26	3	3	2	3	2,66	26	2	2	1	3	2
27	1	4	3	2	3	27	3	1	2	3	2
28	2	2	2	2	2	28	2	2	3	1	2
29	4	3	3	3	3	29	3	1	2	2	1,66
$\sum X_E$	67,5	76	62	66	68	$\sum X_E$	57	57	55	59	57
X_E	2,32	2,62	2,13	2,27	2,34	X_E	1,96	1,96	1,89	2,03	1,96

Table B3
Students' Scores in Activity Three

N	Experimental Group					N	Control Group				
	Pre-test	Post-test 01	Post-test 02	Post-test 03	Av		Pre-test	Post-test 01	Post-test 02	Post-test 03	Av
01	4	3	1	2	2	01	2	1	1	1	1
02	3	1	4	3	2,66	02	1	1	2	2	1,66
03	2	2	5	2	3	03	2	2	3	3	2,66
04	0	1	2	1	1,33	04	2	2	1	1	1,33
05	4	2	5	2	3	05	1	3	1	3	2,33
06	2	3	2	4	3	06	3	3	1	1	1,66
07	4	1	4	2	2,33	07	4	4	4	5	4,33
08	3	4	2	2	2,66	08	1	1	2	2	1,66
09	2	2	4	2	2,66	09	4	4	4	2	3,33
10	1	1	3	4	2,66	10	0	0	0	2	0,66
11	3	1	2	2	1,66	11	0	1	2	2	1,66
12	2	2	3	4	3	12	0	0	0	1	0,33
13	3	3	4	4	3,66	13	2	2	2	1	1,66
14	2	2	2	1	1,66	14	3	3	3	3	3
15	1	3	2	4	3	15	1	3	2	2	2,33
16	3	2	4	3	3	16	2	2	3	2	2,33
17	3	2	1	1	1,33	17	2	2	0	0	0,66
18	3	4	3	4	3,66	18	3	4	2	2	2,66
19	3	3	1	1	1,66	19	3	3	2	3	2.66
20	1	0	1	2	1	20	2	3	1	3	2,33
21	1	1	1	2	1,33	21	2	1	3	1	1,66
22	3	3	1	4	2,66	22	2	2	3	3	2,66
23	2	3	2	3	2,66	23	0	1	1	2	1,33
24	2	4	1	3	2,66	24	1	1	2	4	2,33
25	0	3	3	3	3	25	1	2	2	3	2,33
26	3	4	4	4	4	26	1	1	4	2	2,33
27	2	3	2	1	2	27	2	2	3	3	2,66
28	2	2	1	2	1,66	28	1	1	3	2	2
29	4	4	4	4	4	29	2	2	2	1	1,66
∑XE	68	69	74	76	73	∑XE	50	57	59	62	59,33
XE	2,34	2,37	2,55	2,62	2,51	XE	1,72	1,96	2,03	2,13	2,04

Table B4
Students' Scores in Activity Four

N	Experimental Group					N	Control Group				
	Pre-test	Post-test 01	Post-test 02	Post-test 03	Av		Pre-test	Post-test 01	Post-test 02	Post-test 03	Av
01	0,5	1	0	2	1	01	1,5	1,5	2	2,5	2
02	0	0,5	1	2,5	1,33	02	0,5	0,5	1	1	0,83
03	2	3,5	3	2,5	3	03	1,5	2	2	2	2
04	0,5	0,5	0	2	0,83	04	1,5	1,5	1	1	1,16
05	0	0,5	0	3	1,16	05	1,5	1,5	1	1	1,16
06	0,5	1,5	3	2	2,16	06	1,5	1,5	2,5	1,5	1,83
07	1,5	3	4	3,5	3,5	07	5	5	3,5	4	4,16
08	1	3,5	3	1	2,5	08	1,5	1,5	1	1	1,16
09	2	1	4	1	2	09	2	3,5	1,5	3,5	2,83
10	0,5	2	4	3	3	10	0	0	1,5	1	0,83
11	0,5	2,5	4	2,5	3	11	1	1	1	1	1
12	0,5	1,5	3	2	2,16	12	0	0	1	0,5	0,5
13	3,5	2,5	3	3	2,83	13	1	1	1	1	1
14	1,5	1,5	1,5	1	1,33	14	1,5	1,5	3	3	2,5
15	1,5	1	2	3	2	15	2	2	2	0	1,33
16	0,5	0	0	2,5	0,83	16	2	2	2	2	2
17	1,5	1	3	2,5	2,16	17	1,5	1,5	3	3	2,5
18	3,5	2,5	4	3	3,16	18	0	0	2	2	1,33
19	1,5	1,5	4	1	2,16	19	0	0	1,5	1,5	1
20	0	0,5	0	2	0,83	20	3,5	2,5	2	2	2,16
21	0,5	1	1	2	1,33	21	3	3	0,5	0,5	1,33
22	1	0	3	3	2	22	2,5	3,5	1	0,5	1,66
23	4	2	2,5	2,5	2,33	23	1	1	1	1	1
24	1	3	1,5	2	2,16	24	1,5	1,5	2	2	1,83
25	2	1,5	3	2,5	2,33	25	1	0,5	1	3	1,5
26	2,5	3	2	3	2,66	26	1	0,5	1	1	0,83
27	1	3	4	0	2,33	27	4,5	3	3	3	3
28	1,5	3	4	1,5	2,83	28	1,5	0,5	1,5	1,5	1,16
29	3	3,5	3,5	2	3	29	1,5	1,5	3	2	2,16
∑XE	39,5	51,5	71	63,5	62	∑XE	46,5	45	49,5	49	47,83
XE	1,36	1,77	2,44	2,18	2,13	XE	1,60	1,55	1,70	1,68	1,64

Table B5
Students' Scores in Activity Five

N	Experimental Group					N	Control Group				
	Pre-test	Post-test 01	Post-test 02	Post-test 03	Av		Pre-test	Post-test 01	Post-test 02	Post-test 03	Av
01	0,5	0	0,5	1	0,5	01	2	3	1	1	1,66
02	0,5	2	1,5	1	1,5	02	0	1	2	0	1
03	1	0,5	2	1,5	1,33	03	3	2	2	2	2
04	0,5	0,5	0,5	1	0,66	04	2	2	1	1	1,33
05	0,5	1,5	2,5	2,5	2,16	05	1	1	2	1	1,33
06	0	1	1,5	2	1,5	06	0	0,5	1	1	0,83
07	0,5	1	2	1,5	1,5	07	3	3	2,5	4	3,16
08	0	1,5	2	2,5	2	08	0	1	2	1	1,33
09	0	0,5	3,5	3,5	2,5	09	2	2	3	3	2,66
10	0,5	0	3	3	2	10	0	0,5	0,5	0,5	0,5
11	1	1	2,5	2	1,83	11	2	0	1	0,5	0,5
12	0	0,5	3,5	1,5	1,83	12	0	0,5	1	0,5	0,66
13	2	1,5	2,5	2,5	2,16	13	0	0	1	1	0,66
14	0,5	2	3	2	2,33	14	3	4	4	3	3,66
15	0,5	1,5	0	0,5	0,66	15	0	1	1	2	1,33
16	0	1	1,5	1,5	1,33	16	4	0,5	1	1	0,83
17	0	1,5	2	2,5	2	17	0	0	0	0	0
18	1,5	1,5	2	1,5	1,66	18	0	2	2	1	1,66
19	0	0,5	1,5	2	1,33	19	2	0	0	1	0,33
20	0,5	0,5	0,5	0,5	0,5	20	0	2	1	1	1,33
21	0,5	0,5	0,5	1	0,66	21	0	0	1	1	0,66
22	2	2	2	2	2	22	2	1	2	0,5	1,16
23	2	1,5	2	2,5	2	23	1	0	0,5	1,5	0,66
24	2,5	2,5	1,5	2,5	2,16	24	3	1	0	1	0,66
25	1,5	1	1,5	1,5	1,33	25	0	1,5	1	0	0,83
26	1,5	2	3	2,5	2,5	26	2	0,5	1	1	0,83
27	0,5	1	1,5	2	1,5	27	1	1	3	2	2
28	0,5	0,5	1,5	1	1	28	2	2	2	2	2
29	2	3,5	3,5	3	3,33	29	0,5	2	2	2	2
∑XE	23	34,5	55	54	47,83	∑XE	35,5	35	41,5	36,5	37,66
XE	0,79	1,18	1,89	1,86	1,64	XE	1,22	1,20	1,438	1,25	1,29

Appendix #13

University of Constantine 01

Department of Letters and English Language

Correlation Coefficient Test

Table C1
Calculation of Correlation Coefficient Test for the Experimental Control Group

N°							
	X	Y	X- M	Y - M	X^2	Y^2	XY
1	5	8,5	-3,025862	-0,01	9,1558413	1E-04	42,5
2	4,5	6	-3,525862	-2,51	12,431703	6,3001	27
3	10,5	9,5	2,4741379	0,99	6,1213585	0,9801	99,75
4	3,75	3	-4,275862	-5,51	18,282996	30,3601	11,25
5	7,75	8	-0,275862	-0,51	0,0760999	0,2601	62
6	5,5	8	-2,525862	-0,51	6,3799792	0,2601	44
7	5,5	9	-2,525862	0,49	6,3799792	0,2401	49,5
8	8	8	-0,025862	-0,51	0,0006688	0,2601	64
9	11	8,5	2,9741379	-0,01	8,8454964	1E-04	93,5
10	6,75	6	-1,275862	-2,51	1,627824	6,3001	40,5
11	7,75	7,5	-0,275862	-1,01	0,0760999	1,0201	58,125
12	6	7	-2,025862	-1,51	4,1041171	2,2801	42
13	10	14,5	1,9741379	5,99	3,8972206	35,8801	145
14	7,25	8	-0,775862	-0,51	0,601962	0,2601	58
15	8,75	8,5	0,7241379	-0,01	0,5243757	1E-04	74,375
16	6,5	7	-1,525862	-1,51	2,3282551	2,2801	45,5
17	8,25	8	0,2241379	-0,51	0,0502378	0,2601	66
18	12,75	13,5	4,7241379	4,99	22,317479	24,9001	172,125
19	8,25	8	0,2241379	-0,51	0,0502378	0,2601	66
20	2,75	4	-5,275862	-4,51	27,834721	20,3401	11
21	3,75	4	-4,275862	-4,51	18,282996	20,3401	15
22	9,25	11,5	1,2241379	2,99	1,4985137	8,9401	106,375
23	12,5	13	4,4741379	4,49	20,01791	20,1601	162,5
24	9,25	10	1,2241379	1,49	1,4985137	2,2201	92,5
25	6,5	6,5	-1,525862	-2,01	2,3282551	4,0401	42,25
26	12	12,5	3,9741379	3,99	15,793772	15,9201	150
27	7,75	6	-0,275862	-2,51	0,0760999	6,3001	46,5
28	10	7	1,9741379	-1,51	3,8972206	2,2801	70
29	15,25	16	7,2241379	7,49	52,188169	56,1001	244
∑XE	232,75	247	-1,24E-14	0,21	246,6681	268,7429	2201,25
XE	8,0258621	8,51			8,5057967	9,2669966	

$$SD_{EX} = \sqrt{\frac{\sum x2}{N}} = \frac{246,66}{29} = 8,50$$

$$SD_{Ey} = \sqrt{\frac{\sum y2}{N}} = \frac{268,74}{29} = 9,26$$

$$r_E\,(xy) = \frac{\sum xy}{(N)(SDx)(SDy)} = \frac{2201,25}{29\times 8,50\times 9,26} = \frac{2201,25}{2285,87} = 0,96$$

Table C2
Calculation of Correlation Coefficient Test for the Control Group

N°							
	X	Y	X - M	Y - M	X^2	Y^2	XY
1	6,5	9,5	-1,413793	0,87	1,9988109	0,7569	61,75
2	2,75	6	-5,163793	-2,63	26,664759	6,9169	16,5
3	10	12,5	2,0862069	3,87	4,3522592	14,9769	125
4	5,25	9,5	-2,663793	0,87	7,0957937	0,7569	49,875
5	7,25	6	-0,663793	-2,63	0,4406213	6,9169	43,5
6	7	8,5	-0,913793	-0,13	0,8350178	0,0169	59,5
7	14,75	16,5	6,8362069	7,87	46,733725	61,9369	243,375
8	7,5	6,5	-0,413793	-2,13	0,1712247	4,5369	48,75
9	14,5	14,5	6,5862069	5,87	43,378121	34,4569	210,25
10	2,75	2	-5,163793	-6,63	26,664759	43,9569	5,5
11	4	5,5	-3,913793	-3,13	15,317776	9,7969	22
12	2	1,5	-5,913793	-7,13	34,972949	50,8369	3
13	7,25	6,5	-0,663793	-2,13	0,4406213	4,5369	47,125
14	9,75	12	1,8362069	3,37	3,3716558	11,3569	117
15	8,5	6	0,5862069	-2,63	0,3436385	6,9169	51
16	10,5	12	2,5862069	3,37	6,6884661	11,3569	126
17	9,25	7,5	1,3362069	-1,13	1,7854489	1,2769	69,375
18	6,5	6,5	-1,413793	-2,13	1,9988109	4,5369	42,25
19	10,5	10,5	2,5862069	1,87	6,6884661	3,4969	110,25
20	10	11,5	2,0862069	2,87	4,3522592	8,2369	115
21	8,5	7,5	0,5862069	-1,13	0,3436385	1,2769	63,75
22	8,25	10,5	0,3362069	1,87	0,1130351	3,4969	86,625
23	6,25	6,5	-1,663793	-2,13	2,7682075	4,5369	40,625
24	12,25	10	4,3362069	1,37	18,80269	1,8769	122,5
25	5,75	6	-2,163793	-2,63	4,6820006	6,9169	34,5
26	4,75	8,5	-3,163793	-0,13	10,009587	0,0169	40,375
27	12	13,5	4,0862069	4,87	16,697087	23,7169	162
28	5,75	8,5	-2,163793	-0,13	4,6820006	0,0169	48,875
29	9,5	8,5	1,5862069	-0,13	2,5160523	0,0169	80,75
∑Xc	229,5	250,5	1,776E-15	0,23	294,90948	329,4501	2247
Xc	7,9137931	8,63			10,169293	11,360348	

$$SDcx = \sqrt{\frac{\sum x2}{N}} = \frac{294,90}{29} = 10,16$$

$$SDcy = \sqrt{\frac{\sum y2}{N}} = \frac{329,45}{29} = 11,36$$

$$rc(xy) = \frac{\sum xy}{(N)(SDx)(SDy)} = \frac{2247}{29 \times 8,50 \times 9,26} = \frac{2247}{3350,27} = 0,67$$

ملخص

يهدف هذا البحث و المتكون من خمسة فصول إلى تطوير مهارة القراءة عند طلاب السنة الأولى ماستر بقسم الالكترونيك بجامعة قسنطينة1، وذلك لأهميتها في توسيع النطاقات العلمية والأكاديمية للطلاب. كما يحاول معالجة المشاكل و الصعوبات التي تعرقل فهم هؤلاء الطلبة للنصوص العلمية وخاصة تلك المتعلقة بالجانب اللغوي و هذا ما أوضحته نتائج الإستجوابات وأكدته نتائج الإختبارات. حيث إعتمدنا في هذه الدراسة على التصميم التجريبي من خلال تطبيق منهجية تقديم دروس في القراءة باللغة الانجليزية و التي تركز على تلقين هؤلاء الطلبة أساسيات الخطاب العلمي والتقني وعناصره وبالأخص العلاقات النحوية والبلاغية جنبا إلى جنب مع المفردات الغير التقنية. النتائج المتحصل عليها من الاختبار اللغوي أظهرت وجود علاقة دلالية متبادلة بين الكفاءة اللغوية و مستوى الفهم ،أما نتائج إختبارات الفهم الأربعة أظهرت أهمية و فعالية المنهجية المطبقة في تطوير فهم الطلبة للنصوص العلمية و التقنية وذلك من خلال التحسن الملحوظ في مستوى الفهم عند الطلاب بعد المعالجة. تعد نتائج هذا البحث دعوة صريحة لإعادة النظر في طرائق تدريس اللغة الإنجليزية في قسم الإلكترونيك ومعاهد العلوم الأخرى.

Résumé

Cette dissertation de cinq chapitres a été conçue pour décrire et analyser les problèmes et les difficultés de lecture et de compréhension des textes scientifiques rencontrés par les étudiants d'électronique à l'université de Constantine1. L'analyse des questionnaires adressés à nos étudiants indiques que leurs problèmes sont le résultat de leur manque de compétence en anglais générale. Dans ce cadre, le dilemme de l'anglais scientifique et technique et l'anglais général, tous les deux pourtant nécessaires, reste toujours posé quant à quel type d'anglais nos étudiants ont vraiment besoin. En effet, cette recherche tente de combler le fossé qui existe dans l'enseignement de l'anglais comme langue étrangère par mettre en application des cours de lecture pour nos étudiants en utilisant le dispositif expérimental avec deux groupes : expérimental et contrôle. Les résultats ont été obtenus en termes de scores et ont été comparés et analysés statistiquement. L'analyse a montré l'importance des cours mis en œuvre dans l'amélioration de la performance des étudiants dans la lecture et la compréhension des textes scientifiques et techniques. Les résultats de cette enquête sont un appel à un réexamen de l'enseignement de l'anglais au Département de l'Electronique, et par extension aux autres départements similaires.