## The Effect of Using Instructional Technology on Pharmacy Students' Reading Comprehension at Al -Isra University

أثر استخدام تكنولوجيا التعليم المعاصرة في تحصيل الاستيعاب القرائي لطلبة الصيدلة في جامعة الإسراء

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#### ملخص

تهدف هذه الدراسة إلى قياس أثر استخدام تكنولوجيا التعليم المعاصرة في تحسين الاستيعاب القرائي لطلبة الصيدلة في جامعة الإسراء عند دراستهم نصوصهم العلمية. تقتصر الدراسة الحالية على طلبة كلية الصيدلة في جامعة الإسراء الخاصة للعام الدراسة ٥- ٢٠ – الاراسة الحالية على طلبة كلية الصيدلة في جامعة الإسراء الخاصة للعام الدراسة ٥- ٢٠ – الإجراءات: جرى أولا تحليل أوراق اختباريه لطلبة الصيدلة لتشخيص الصعوبات اللغوية، ثم الأحراءات: جرى أولا تحليل أوراق اختباريه لطلبة الصيدلة لتشخيص الصعوبات اللغوية، ثم المعوبات، بعد ذلك بني اختبار في ضوء تحليل الأخطاء من أجل التركيز على المصادر الرئيسية للصعوبة. بعد التحقق من صدق وثبات الاختبار، طبق على عينة مكونة من ٢٠ طالب قبل البدء بتجربة طبق فيها الباحث الأساليب التدريسية المعاصرة المبنية على تكنولوجيا التعليم قبل البدء بتجربة طبق فيها الباحث الأساليب التدريسية المعاصرة المبنية على تكنولوجيا التعليم المدة ثمانية أسابيع وفي نهاية التجربة أعيد تطبيق الاختبار القبلي (الذي أصبح اسمه الاختبار قبل البدي إلى من ما تقدم – إن كان هناك تقدم- الذي قد يكون الأفراد الخاضعين للتجربة قد البعدي) لغرض قياس التقدم – إن كان هناك تقدم- الذي قد يكون الأفراد الخاضعين التجربة منوبات العوية، ويتضح ذلك في التجربة أعيد تحميل عينة المعاصرة المبنية على تكنولوجيا التعليم المدة ثمانية أسابيع وفي نهاية التجربة أعيد تطبيق الاختبار القبلي (الذي أصبح اسمه الاختبار البعدي) لغرض قياس التقدم – إن كان هناك تقدم- الذي قد يكون الأفراد الخاضعين للتجربة قد البعدي العربة نتائج التجربة فاعلية تكنولوجيا التعليم المعاصرة في التغلب على الصعوبات حقوه. أظهرت نتائج التجربة واعلية تكنولوجيا التعليم المعاصرة في التعليم المعوبيات منائج التجربة أيضًا تحسنا هاما وملحوظا في فهم أولئك الطابة للنصوص العلمية. وقدم الباحث

### Abstract

The present study aims at investigating the effect of improving the reading comprehension of pharmacy students at Al- Isra university for the academic year 2005-2006. To fulfill the aims of this research, a number of procedures were followed. First, test papers of students of pharmacy were analyzed to identify the linguistic difficulties. Certain instructional technologies were suggested to help students overcome these difficulties. After that, a test was constructed in light of error analysis in order to investigate improvement of students' reading ability. After establishing test validity and reliability, it was administered to a sample of 25 students prior to an experiment in which the suggested contemporary teaching techniques based on instructional technology were applied by the researcher for eight weeks. Then the pretest (renamed posttest) was conducted at the end of the experiment in order to measure the progress, if any, the subjects of the experiment may have made. The findings of the study revealed that the suggested instructional technologies adopted in the experiment were effective in improving students' comprehension of scientific texts. A number of recommendations and suggestions for further research are put forward.

## Introduction

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

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

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English for special purposes courses are needed because it has been found that students, those of science in particular, studying at the university level face difficulties in comprehending their texts. These difficulties, according to LaBerge and Samuels (1977:217), "arise in understanding how words and clauses in a sentence are related to other sources of information".

The process of reading and comprehending in one's native language (LI) is very complex, due to the myriad of factors that interact with each other in a non-linear and non-sequential manner. The issues and their accompanying complexity are further compounded when describing and understanding reading comprehension in a second or foreign language (L2). In facilitating L2 reading comprehension, the use of sound, pictures, and animated pictures or video in addition to text have played an important role in vocabulary acquisition and in overall text comprehension, and are unquestioned components of instructional materials for language learning (Chun & Plass; 1996). The possibility of an instructional use for these different modes of information on a computer raises questions concerning learning from media (Culver, 1991), and concerning the specifics of language learning with multimedia.

There are questions of special interest regarding the difference in cognitive processes in learning from different sources, and regarding the effect of individual learner differences on learning from media. How does the process of comprehension of text. Multimedia environments allow for the addition of visual and auditory information to a text in order to improve comprehension? Based on the differences between comprehending text and comprehending graphics, we will then expand our model by identifying the function of multimedia information as aids to text comprehension.

The difference between learning from text and learning from pictures results from the different types of representations of knowledge: Text represents information in symbolic structures of a language and is processed sequentially, that is, word by word.On the other hand, convey their information by means of a visuo-spatial structure (i.e., subject

matter by employing an analogy based on common structural properties and encode information in parallel or simultaneously (James, 2010)

The introduction of aids in presentation modes other than text can be based on three types of aids for text comprehension. Although the process of learning from different sources of information, using different types of representations of the subject matter, can engage the learner in qualitatively different cognitive processes, it is ultimately the function of the three different types of aids in the process of text comprehension that is of interest. For example, the integration of new information into the existing mental model can be supported with a concrete advance organizer (Mayer, 1984). This advance organizer could be presented wither as text or a video. Although the cognitive processes involved in comprehending the text are qualitatively different from those involved in comprehending the video. The function of the concrete advance organizer as support for the integration of information into the mental model remains unchanged, irrespective of the presentation mode.

With the use of information in multiple presentation modes, the aids for text comprehension could conceivably be presented in textual form, in visual form, in auditory form, or in any combination of these presentation modes. It should be emphasized that the processing of the material is the focus of our investigation, not the stimulus material provided to the learner. While spoken text as an auditory form of presenting information is perceived by the learner through a different perceptual channel than a written text, it is like written text in using a symbolic representation of information, and thus involves similar cognitive processes of text comprehension. Visual information, on the other hand, there is an analog representation of information that can be directly mapped onto the mental model by establishing an analogy between the visual information and the corresponding mental model (Levine and Reves, 2005) Some media are better than others at communicating certain kinds of information . For example when a learner needs to remember a small amount of verbal information for a short period of time, information that is using text. (David, 1987)

A picture, it is commonly said, can be worth a thousand words. Pictures seen to help people learn information more effectively than text. This picture superiority effect appears to be strong. For example, picture of common objects were recalled and recognized better than their textual names. (James, 2010; Levine and Reves, 2005; and Chunng,1996) Exceptions seem to occur when the items are conceptually similar (e.g.; all animals or all tools), causing the pictures to be easily confused or when the items are presented so quickly that learners cannot create verbal labels for the pictures. Also, pictures cannot be used to communicate abstract concepts, such as "freedom" and "amount."

Pictures also seem to be better than text or auditory instructions for communicating information. For example, pictures helped people to draw and label the story, and solve bus route problems. To communicate motion – based information that changes continuously over time, when it is important to show how the information changes over time, animation and video appear to be useful (Mayer, 1997)l.

In summary, learning from a text and learning from pictures are qualitatively different ways of constructing mental models. While, text comprehension is an indirect transformation between a text as a symbolic representation and the mental model as an analog representation. Picture comprehension is a direct mapping of the picture as an analog representation onto the mental model as an analog representation by establishing an analogy between the visual information and the corresponding mental model (James,2010). These qualitative differences can be used to aid text comprehension, namely, in supporting the processes of selecting information, organizing the presented information into a coherent structure, and integrating these new ideas into the existing mental model (Mayer, 1984).

### Statement of the problem

Students of pharmacy at Al-Isra University face various types of difficulties in understanding what they read. These difficulties may be attributed mainly to the difficulties that are found in the foreign text. These difficulties will have a negative effect on understanding the

meaning of the written text, and, consequently, students will lose the opportunity to achieve progress in learning their field of study. This problem might be due to the fact that reading comprehension is taught conventionally without using instructional technology.

### **Purpose of the Study**

The purpose of the present study was to investigate the effect of a proposed instructional technology strategy on improving students' achievement in reading comprehension.

### Hypothesis

There is no statistically significant deference a <0.05 in the mean scores of student that can be attributed to the teaching method.

### Significance of the study

A number of studies have been conducted to investigate the teaching of reading comprehension, yet no scientific research in the field of using instructional technology to overcome linguistic difficulties faced by students of pharmacy in comprehending scientific text has been carried out to the best of the researcher's Knowledge. The present study is expected to redeem this deficiency by examining the effect of using certain teaching techniques on students' ability to comprehend scientific texts. If proved efficient, these techniques as well as the other findings of this research will be of great value to all those involved in teaching ESP courses from syllabus designers down to students, too.

### **Definition of basic terms**

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

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

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- 2. Comprehension: is "The act of understanding the meaning of printed or spoken language as contrasted with the ability to perceive and pronounce words without reference to their meaning". (Good 1973: 123).
- **3.** Reading comprehension: is "the linguistic process of reconstructing the intended message of a text by translating its lexical and grammatical information into meaningful units that can be integrated with the reader's knowledge and cognitive structures". (Harris and Hodges, 1982: 266). A reading skill is "a cognitive ability which a person is able to use when interacting with written texts'. Reading skills are seen as part of the generalized reading process (Urquhart and Weir, 1998:88).
- 4. Instructional Technology: It refers to the audio-visual technology such as; radio, tape recorder, TV, satellites, data-show, internet, multi-media, DVD, videos, etc.
- 5. Linguistic Difficulties: are" the structural problems that are the product of complex syntax, which often characterizes unsimplified English writing". (Eskey, 1975:211). Linguistic difficulties in the present research extend to include, in addition to syntax, morphology, vocabulary, textual and rhetorical difficulties.

### Limitations of the study

The study is limited to students of pharmacy studying at Al-Isra University for the academic year 2005-2006. Therefore the generalizability of result is applicable to similar contexts only.

## **Review of related literature**

Reading comprehension skill has been the subject of many studies. One of the issues in reading comprehension is the effect of applying different reading methods or strategies on the students' achievement.

Holmes (1985) conducted a study that aimed at determining which of four modes of reading (oral reading to an audience, oral reading to oneself, silent reading, silent reading while listening) best facilitates the

answering of the post comprehension questions. The comprehension questions included gist, literal recall of details, inferences and comparisons. Her sample consisted of 48 students enrolled in undergraduate course. The subjects were asked to read an expository passage in each of the four modes. Holmes found out the silent and oral readings to oneself were superior to reading to an audience. She also found out that silent reading facilitated comprehension to a greater extent than silent reading while listening to the text being read.

A variety of studies have shown the importance of using computers in ESL reading (Willet, 1992). Chun & Plass (1996) investigated how reading comprehension can be facilitated with a multimedia application for language learning. They studied the effects of a dynamic visual advance organizer on the macro level and the effect of multimedia annotations for single vocabulary items on the micro level. Furthermore, they examined the relationship between vocabulary acquisition and reading comprehension. The results of their study indicated that the visual advance organizer does aid in overall comprehension and that annotations of vocabulary items consisting of both visual and verbal information help more than verbal information only. Also, a moderate correlation between vocabulary knowledge and reading comprehension was found. Chun & Plass claimed that results support the dual coding theory and its extension to multimedia learning and emphasize the significance of visual information in addition to verbal information to support both top-down and bottom-up processing in reading in a foreign language.

In another study to improve reading speed and comprehension of ESL students using computers, Culver (1991) implemented a computer reading program to determine the exit and entrance scores of ESL college students and to find out if their reading speed and comprehension would improve. The results showed some improvements for the majority of students in the target group with an overall increase of 3.9 grade level in reading rate. The results show important information about the effect of increasing reading speed on student comprehension as a result of employing computers. It was concluded that the computer was a good

tool for improving students' reading rate despite the fact that increased speed did not lead to increased levels of comprehension over the last several years, research in reading comprehension has provided the impetus for changes in our thinking about comprehension instruction. From this research, new instructional frame works for teaching comprehension have been developed. Studies of instruction confirm that we can do a better job of teaching comprehension by using these new instructional frame-works than by following the traditional basal reading paradigm. This article synthesizes recent research on comprehension instruction and presents a new conceptualization of instruction. Representative instructional studies of inference training, reciprocal teaching, and process training are reviewed. The concept of explicit comprehension instruction is then described and contrasted with more traditional models of direct instruction. Next, potential difficulties in implementing explicit comprehension instruction in classrooms are discussed. Finally, two important curricular concerns are raised compares the results of 27 controlled evaluations of the effect of technology on student achievement in reading writing mathematics and the natural and social sciences The report groups the reading studies into categories of a integrated learning systems, b)writing – based reading programs and c reading management systems. Studies on the effects of technology on student writing were grouped into a word processing studies, b studies of computer writing prompts and c studies of computer enrichment.

Chun D. & Plass J. (1997) based on underlying theories of L2 reading comprehension and text comprehension with multimedia, discussed "how L2 reading research is focusing increasingly on the cognitive processes involved in reading, that is, the interaction of lower-level, bottom-up processes such as vocabulary acquisition with higher level, top-down processes such as activating prior knowledge" (p.60). They merged this understanding with existing research on learning with technology to find out how students with different learning abilities put together "verbal and visual information". Their goal, in this study, was not to determine the effectiveness of multimedia on reading

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comprehension, but rather the learners who may benefit from multimedia instruction.

Preisinger, R. (1988) used the schema theory as a basis to evaluate reading software programs. They developed criteria and questions to evaluate: 1) interactive capabilities of reading software (e.g. its flexibility, response to student errors, and ability to make a distinction between major and unimportant error), 2) information processing (e.g. support of the use of prediction and problem solving strategies, use of text-based activities in the context of a reading passage, and encouragement of analyzing texts), 3) background knowledge (e.g. building schemata though pre-reading activities), and 4) general software construction and implementation. The goal of this study was to develop an evaluation tool based in light of a theory to help teachers choose the right reading programs for their students.

In an extension of the dual coding theory to multimedia learning, Mayer and Sims (1994) found that the contiguous presentation of visual and verbal material made it more likely for the learner to build referential connections between the visual representation and the verbal representation in short-term memory, which resulted in better performance in transfer tasks than the successive presentation of the materials, especially for high-ability students. The advantages of storing information in two different systems are: (a) a more elaborate encoding, resulting in more retrieval routes to the material; (b) the possibility of storing more information in these two systems; and (c) the opportunity to store information, for example, symbolically coded information in the verbal system, or information coded in an analog form in the nonverbal system.

On a macro level, text comprehension with multimedia can be interpreted with a generative theory of multimedia learning (Mayer, 1997). The generative theory of multimedia learning views the learner as knowledge constructor who actively selects relevant words and images from the information presented, organizes these words and images into coherent mental representations, and integrates the newly constructed visual and verbal representations with one another (Mayer, 1997). These

cognitive tasks are based on cognitive abilities and cognitive styles of the individual that have an influence on the preference for using one type of information over another, and on performance when the learner is allowed to use either visual or verbal information, or a combination of both, for learning.

In summary, we postulate that different cognitive processes are involved in micro level processing and macro level processing of multimedia information. On a micro level (e.g., vocabulary acquisition), the presentation of visual information contiguously with verbal information results in the construction of referential connections between the verbal and the visual mental representations of the material, and the storage of the information in two different systems, a verbal and a nonverbal system (dual coding). On a macro level (e.g., overall text comprehension), visual information serves as an aid for text comprehension and functions as supplemental information that is added to the mental model of the text by mapping the analog visual representation onto the analog mental model. The visual information can aid in text comprehension in three different functions: (a) in selecting information, (b) in organizing the selected information into a coherent structure of propositions using cognitive schemata, and (c) in integrating these propositions into the mental model. Consequently, visual material to support vocabulary acquisition has to be designed differently from processes to be supported. It can be expected, however, that under some circumstances the use of different presentation modes of information can have deleterious effects in the processing of the information. This will be the issue of the following section.

### Population

The population of the present study is the students of pharmacy at Al-Isra University for the academic year 2005-2006. The total number of the population is 335 students.

### Sample

The sample of the study is of two types. The first one is the pilot study sample totaling 25 students of pharmacy who registered the ESP

course named *English 2* section A, in the second semester of the academic year 2005-2006. The initial form of the test is administered to this sample for the purpose of establishing its reliability and analyzing the items. The second sample consists of 35 students constitutes those who registered the ESP course named *English (2)* section B, in the second semester of the academic year 2005-2006, and they are subjected to the experiment in which the instructional technologies are applied.

## Procedures in Conducting the Study

## 1. Identification of linguistic difficulties:

To achieve the aim of the study, a random sample of 25 students' responses to their final course examination in the previous semester is collected. Errors are analyzed and classified by the researcher into main categories (see Richards, 1974:20), calculating the percentage of each category (see table I). The adopted model for error analysis is identified by the following steps:

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

**Table (1):** Percentages and Frequencies of the Main Categories of ErrorsMade by Pharmacy Students in Reading Comprehension.

<b>Category of Errors</b>	No. of errors	Percentage of errors %
Syntactic	173	67.62%
Spelling	42	20.43%
Expression	10	6.35%
Punctuation	9	5.65 %
Total	234	100 %

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### 2. Reading comprehension teaching activities

## 2.1. Pre-reading (planning) activities

Pre – reading activities are used before the students read the entire text. These include brainstorming, class discussion, anticipating content and other tasks that can be summarized in two main categories: previewing and prediction. These activities can be introduced using different instructional technologies that facilitate the teaching and learning process.

## 2.1.1. Previewing

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

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

This can be accompanied with language teaching technologies such as data-show and computer.

## 2.1.2. Prediction

Prediction means making intelligent guesses about what a text-book, chapter or section contains using only a small sample of the text. This can be done using different audio-visual technologies.

### 2.2. While-reading (monitoring) activities

Pearson and Fielding (1991) identify two generic while-reading strategies and practices to support students to engage independently and actively with text. They are self-question and self-monitoring. This can be achieved using multi-media and other technologies.

### 2.3. Post- reading (evaluation) activities

Questions of evaluation and personal response are also seen by teachers and textbook writers as a valuable post-reading activity.

Readers can be encouraged to relate content to their existing schemata and to evaluate it in the light of their own knowledge and experiences.

This promotes greater interaction with text and may lead to more successful reading encounters. This can be done using varied teaching technology.

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

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

After mastering the basic elementary reading skills such as word recognition skills and vocabulary building skills, the reader reaches a more advanced stage in which he/she uses other types of skills. Some of these skills which Thonis (1971) focuses on in her treatment to reading comprehension are the readers' ability to:

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

- f. use the dictionary and glossary to improve their knowledge of word meanings,
- g. know the meanings of the common affixes which helps in unlocking difficult words,
- h. use consistencies group words, phrases, parts of sentence to get though units, and
- i. know the common connective words (conjunctions and prepositions).

All the up mentioned reading comprehension teaching activities were introduced conventionally to the control group, but they were introduced to experimental group with the help of instructional technology that included the following :

# **3.** Contemporary instructional technologies for teaching RC to the experimental group

## 3.1. Electromagnetic technology

- Radio.
- The tape-recorder.
- The overhead projector.
- The slide and film-strip projector.
- Television and video tape records.

## 3.2. Electronic digital computer-based technology

With the recent introduction of computer education at all levels of schooling in Jordan, the role of the electronic digital computer – based technology will witness an increase role in the teaching of English to Jordanian students. Teachers of English should invest their students' skills in using the computer to enhance their abilities in learning English, and they should also use their own abilities in this respect to develop the methods and devices of teaching English.

## **3.2.1. Internet – based applications:**

The World Wide Web (www) is an Internet application that can be employed in the teaching of reading comprehension. It offers students and teachers huge authentic materials directly from the target language countries. It provides interactive delivery of text, audio (sound, voice, and music) and video (graphics, picture, and animation). The teacher may assign students a specific topic and then have them search certain web sites in English and make notes, and then sit together and talk about the materials students have collected. Assignments can be also submitted, corrected and graded on-line. (Saanntha, 1997).

### 3.2.2. Non internet – based applications

A wide variety of non Internet software is available for English Language teachers and learners. Comprehensive reference work such as; Lexicon provides access to dictionaries and encyclopedias on a single CD-ROM. Some CD-Rom programs use multimedia to provide visual context and textural references material to help the learner master reading comprehension techniques. Grammar teaching can benefit a lot from specialized programs.

### 3.2.3. Digital audio and video

Audio-visual scientific text on different topics taken from native English societies can be played back, with the assistance of digital audio and video devices, in different speeds tuned according to students' proficiency levels. The language materials provided in this way are real, interesting and native. They allow for a low profile language environment resulting in less-bored, stressed, and more challenged student. DVD system is an example of such teaching technology.

Specialized language programs emphasize on the oral comprehension oral production, and non verbal characteristics of face-to-face interaction. Moreover, digital audio and video can be placed on video-capable file servers. This allows different segments of a video or audio clip to be accessed by multiple users and from their own computers. Such server setup means that teachers and learners in remote location with network

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access can use instruction materials. This technology help students overcome many linguistic difficulties they face in comprehending scientific text since language is an ear before being an eye (reading).

### 3.2.4. Language lab systems

The language lab has been expanded beyond its traditional in – class audio cassette form. It nowadays incorporates multiple-media resources such as audio CD, satellite and video. It also allows for several groups of users to have access to these different resources simultaneously. These systems may also be adapted to include computer station. An example of using such technology in language teaching is their capacity to "bookmark" challenging segment of a tape (students can return to them later), and the capacity of response analyzers to automatically generate student self – evaluation of test scores following completion of an exercise or test. This technology is very useful in ESP classes.

### 3.2.5. Satellite television

Relevant and suitable satellite television programs on pharmacy can be a rich source for developing student's comprehension.

### Design of the study

The experimental design adopted in this study was the one-Group pre-posttest design which can be displayed as follows:

Pre-test	Treatment	Post-test		
T 1	Х	Т2		

In this design, a pre-test was administered to a group of students. Then, they were exposed to an experimental treatment after which they took the same test as a posttest. The experimental treatment in the present study was the use of instructional technologies in teaching reading comprehension by the researcher.

### **Research Instruments**

Four units of the prescribed textbook for students of pharmacy constituted the teaching material. The reading comprehension tests consisted of 4 parts covering four different levels: literal, interpretive, critical and creative.

The test fell into three parts: The first part dealt with reading comprehension which includes 16 items. The second part of the test, consisted of 24 items, which covered vocabulary, while the third part with 31 items which covered morphology and syntax. The items of these two parts were taken from Mullen and Brown (1987) and Glendinning and Holmstrom (1998).

The initial form of the test was administered to a sample of 25 students from the same population after the establishment of the face and content validity of the test.

The procedure followed in item analysis was to separate two subgroups of test papers after ranking them discordantly according to their scores. An upper group consisting of the top 27 % group, and a lower group including the bottom 27 % this percentage was considered the best proportion for use in item analysis (Remmers, 1965). Therefore, for each test item, the researcher tabulated the number of students in the upper and lower groups who select each alternative or give each possible response.

Then, the difficulty level of each item was calculated. That was simple with the proportion of the examinees who answered the item correctly. Applying the item difficulty formula, it has been found that the difficulty level ranges from 0.125 to 0.81. Bloom (1981) states that a good spread of results can be obtained if the test items vary in difficulty from 20 to 80 percent.

Another important factor in item analysis is the calculation of the item discrimination power. It is "the difference between good and poor students in proportions of correct responses" (Ebel, 1972: 325). It is found that it ranges from 0 to 0.75 (see Table 2). Ebel (ibid: 406) notes

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that "good classroom test items should have indices of discrimination of 0.30 or more".

As shown in Table 2, there are few items which are weak in their difficulty level or discrimination power –items No. 14.40 and 60. These items are consequently modified to remedy such weakness.

Items	DL	DP	Items	DL	DP	Items	DL	DP
1	0.68	0.5	26	0.78	0.350	51	0.75	0.25
2	0.411	0.25	27	0.511	0.350	52	0.75	0.25
3	0.210	0.25	28	0.20	0.350	53	0.75	0.25
4	0.418	0.25	29	0.540	0.350	54	0.75	0.375
5	0.687	0.5	30	0.411	0.525	55	0.5	0.375
6	0.60	0.25	31	0.620	0.75	56	0.20	0.375
7	0.78	0.25	32	0.81	0.75	57	0.325	0.75
8	0.73	0.05	33	0.620	0.325	58	0.20	0.325
9	0.17	0.25	34	0.324	0.75	59	0.325	0.75
10	0.482	0.375	35	0.119	0.25	60	0.75	0.25
11	0.360	0.5	36	0.301	0.611	61	0.275	0.25
12	0.85	0.25	37	0.327	0.325	62	0.375	0.375
13	0.523	0.5	38	0.5	0.25	63	0.320	0.25
14	0.6	0.5	39	0.77	0.25	64	0.25	0.5
15	0.482	0.375	40	0.75	0.25	65	0.25	0.25
16	0.273	0.25	41	0.20	0.75	66	0.25	0.25
17	0.430	0.25	42	0.75	0.57	67	0.75	0.25
18	0.411	0.5	43	0.25	0.75	68	0.20	0.325
19	0.23	0.25	44	0.20	0.225	69	0.75	0.25
20	0.320	0.25	45	0.75	0.27	70	0.75	0.25
22	0.422	0.5	47	0.680	0.75			
23	0.420	0.25	48	0.610	0.275			
24	0.6	0.25	49	0.630	0.275			
25	0.370	0.25	50	0.301	0.350			

**Table (2):** The Results of Items Analysis DL= difficulty level, DP = discrimination power.

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## Validity

To achieve face validity and content validity of a test in reading comprehension, the passages and the test items were given to a jury of specialists in ELT (Harris, 1969:18). So the test was given to a jury of experts in linguistics and ELT for content and face validity .One of the experts was specialized in linguistics, the second in applied linguistics, the third in education, and the fourth with assessment and measurement .

In the light of the jurors' opinions, a number of modifications were made.

### Reliability

There are several ways of measuring the reliability of tests such as test-retest, split-half, Kuder-Richardson, and equivalent-forms methods. The method used for estimating the reliability of the test of the present study which provided an index on the internal consistency of the test, was Kuder-Richardson which required information on the difficulty (proportion of correct responses) of each item in the test. The computed coefficient of reliability was 0.835. The pilot study sample totaling 25 students of pharmacy who registers the ESP course named *English 2*, section A, in the second semester of the academic year 2005-2006, sat to the test for the purpose of establishing its reliability and analyzing the items.

### **Data collection**

After the requirements of the experiment were met and all instruments prepared, the experiment started on February 20, 2005 by administering the pretest. The researcher himself, with 21 years experience of teaching English, taught the study subjects. Three hours per week. Five units of the prescribed textbook were covered during the experiment. The researcher used different technologies in each lecture; after or before being exposed in any audio visual material.

Pre-reading tasks included previewing, presentation of new vocabulary items, discussion and brainstorming. Through reading

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activities involved silent reading to allow for text processing, note-taking, summarizing and finding the main idea for each paragraph. The final phase, post-reading tasks, included various exercises such as; question and answer, true-false exercises, finding out the topic sentence.

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

### Results

To investigate the efficiency of the proposed instructional technologies in improving reading comprehension of students, and to test the null hypothesis," *There is no statistically significant deference* a<0.05 in the mean scores of student that can be attributed to the teaching method ". The two -tailed t-tests for two dependent samples was used. The mean score of the pretest scores was 27.2 whereas that of the post-test scores were 45.13. It was found out that the null hypothesis was rejected since the computed t – value (13.020) was greater than the tabulated t- value for 29 degrees of freedom and 0.001 level of significance which was 3.540. This means that the difference between the subjects' scores on the pre-posttest is significant in favor of the post-test. In other words, the independent variable in the experiment i.e. the instructional technologies turned out to be effective.

**Table (3):** T-test Statistics for Testing the Difference Between the Study Subjects' Scores in the Pre-posttest of RC.

Test	N	- IV	$\overline{\mathbf{n}}$	ם	аf	t-value		Level of
Test	19	X	D	$D_{\overline{D}}$	uı	computed	table	significance
Pre- test	25	27.2	18.020	1 240	20	12.020	2 5 4 0	0.001
Post- test	35	45.13	18.020	1.240	29	13.020	3.340	0.001

Moreover, an elaborated statistical analysis of the students' responses to the sub domains of the pre -posttest was conducted using the above-mentioned T-test to reveal precisely the area in which progress was attained by these students. The results of this analysis showed statistically significant differences between the subjects' scores in the majority of the sub domains of the pre-posttest in favor of the post-test (See Table 4). More specifically, the vocabulary aspect has undergone the most prominent improvement, followed by syntax, morphology, literal RC, inferential RC, and style respectively as a result of using instructional technologies The critical level of RC did not only indicate a significant difference, but also it indicated much cultivation in students' minds.

Test sub	No.	No. of		SD	d f	t-value	Level of
domains	of items	subject s	D			Computed	significance
Literal RC	6	35	-1.260	0.220	29	-4.281	0.001
Inferential RC	6	35	-1.6	0.239	29	-4.101	0.001
Critical RC	1	35	-0.146	0.263	29	-1.202	0.05
Vocabulary	26	35	-5.040	0.641	29	-5.330	0.001
Morpholog y	6	35	-3.024	0.350	29	-5.320	0.001
Syntax	20	35	-6.5	1.01	29	-5.671	0.001
Style	6	35	-0.397	0.113	29	-1.094	0.05

**Table (4):** T-test Statistics for Testing the Differences Between the Study Subjects' Scores in the Sub Domains of the RC Pre-posttest.

### Interpretation and discussion

As shown earlier in the statistical analysis of results, the instructional technologies adopted by the researcher in his experiment proven effective

since the achievement of the study subjects greatly improved on the posttest administered at the end of the experiment.

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

- 1. The area of language which reflects the greatest improvement is vocabulary. This is regarded as logical and natural as a result of the students' exposure to a number of audio visual texts throughout the experiment, as well as the effect of such technologies in increasing the students' vocabulary.
- 2. Students of pharmacy have greatly benefited from the instructional technologies in developing their treatment of the syntactic components of their texts.
- 3. Students' literal and inferential levels of comprehension have also witnessed noticeable progress due to the efficacy of the adopted using instructional technologies.
- 4. Instructional technologies made readers possess a large receptive vocabulary and knowledge of syntactic and rhetorical structure which can be exploited to promote their RC.
- 5. Like brainstorming in the pre-reading phase of reading instruction can better improve students' level of RC by allowing them to express themselves freely in class on a topic relating to a reading passage before the reading activity starts.
- 6. Instructional technologies stimulated the students and created a lifelike activity inside the classroom by initiating discussion, asking students to reproduce part or all of a text, or asking them to find certain things in the text.

The research findings indicated that technology environment might contribute to the development of literal reading comprehension skills, audio-visual critical literacy skills, and referential reading comprehension

more than the conventional reading environment. This development may be due to the fact that the Net Search assignments call for independence in reading and decision making. Using the individual texts from the content unit as a source of background information, students must read through a number of web pages in search of the information requested. This selection process is based on the application of global reading skills, on the ability to make use of relevant background knowledge, to focus on major content, and to critically evaluate that content, to draw and test inferences. In other words, it suggested that instructional technology may play an important role in the development of independent reading ability. Such findings go with many studies that emphasize the significance of instructional technology in teaching reading comprehension such as, (Chun and Pass 1990; Culver, 1991; James,2010; Levine et al , 5005,Mayer, 1997;Holmes 1999 ; and Willet, 1992).

The differences found between using instructional technologies and the conventional classes with regard to the development of critical reading skills may be attributed to the advantages of the audio visual environment. The use of such technology enabled the students and the teacher to isolate highlight problematic sections of text, in order to focus on specific points that needed elaboration and to copy/paste from two or more texts to illustrate points that required comparison.

Regarding the teacher's role in an audio-visual academic reading classroom, as compared to the teacher's role in the conventional classroom, a noticeable difference was observed. In the computerized environment, the teacher's role could be described as that of an observer and facilitator. Through the use of Class Net, the teacher could interact with each student during every class meeting. As a result, the students in the experimental groups had more opportunities to get individual assistance, to clarify points and/ or discuss problematic issues. Moreover, the teacher-student interaction was conducted in complete privacy thus allowing for a free exchange of critical comments. The students could disagree with the teacher in a variety of cases, but this disagreement did not create problems in the networked classroom; its rater led to discussion, mutual understanding and assistance.

In the conventional class, the role of the teacher was much more authoritative. While in the computer class students could take initiative and work on the material of their choice; In the conventional classes it was the teacher who decided upon the content of the lesson, as well as on the order and pace of work.

The atmosphere in the audio-visual classes was that of cooperation and collaboration: students assisted each other in handling the computers as well as in finding shortcuts in locating material for the Net Search assignments. There was hardly any opposition on the part of the students to the need to put in extra hours, beyond class time, in order to carry out Net Search assignments.

### Conclusions

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

- 1. Instructional technologies enhance students' RC.
- 2. Instructional technologies are tailored to remedy certain linguistic difficulties encountered by students have stronger impact on their RC.
- 3. Reading skills, especially those of inferential and critical reading can be developed and improved through training.
- 4. The use of instructional technologies widens the students' vocabulary repertoire and thus promotes their RC.
- 5. The audio-visual learning environment affects the development of EFL critical reading skills and strategies to a greater extent than the conventional environment.
- 6. The audio-visual environment provides the learner with the possibility of authenticity in academic reading. It simulates conditions outside the physical boundaries of the class thus easing the student's transition from the learned reading skills to authentic reading skills.

Working in a networked computer environment, students at a lower level of proficiency can identify their reading problems, manipulate the text in order to highlight the problematic sections and thus deal with close and global reading skills. This work prepares the student for higher level critical reading skills. Students at a higher level of proficiency can proceed at their own pace, focus on major content, draw and test inferences, monitor their progress and critically evaluate their reading.

- 7. The teacher's role in an audio-visual EFL classroom is mainly that of mentor and facilitator. Through the use of Class Net, the teacher provides assistance when it is appropriate and necessary without interfering with the student's initiative regarding the choice of material and pace of work.
- 8. The computerized environment enables and encourages the student to take initiative and to assume responsibility for her/his own progress, to make sense of the texts read and create meaning. The findings revealed in the study should justify further large-scale research addressing the issue of computer-assisted academic reading instruction.

## Recommendations

- 1. Teachers should be familiarized with effective and useful techniques through special in-service training programs.
- 2. ESP textbooks should be purposefully designed to meet the needs of ESP learners in their various specializations.
- 3. Texts selected to be included in ESP textbooks should be authentic, i.e. exhibit the characteristics of true discourse: being coherent, and clearly graded and organized.

## **Suggestions for Further Research**

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

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- 1. Investigate the effect of instructional technologies adopted in this study on academic studies other than pharmacy in order to get a comprehensive view of the field.
- 2. Examine the effect of multi-media on student's progress in any of the four language skills.
- 3. Suggest teaching techniques for overcoming difficulties that ESP students encounter in their writing and examine the effect of applying such techniques.

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