

## 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 الدراسي ٢٠٠٥ - ٢٠٠٦، والبالغ عددهم ٣٣٥ طالباً وطالبة. تحقيقاً لأهداف هذا البحث تم اتخاذ عدد من الإجراءات: جرى أولاً تحليل أوراق اختباريه لطلبة الصيدلة لتشخيص الصعوبات اللغوية، ثم اقترحت أساليب تدريسية مبنية على تكنولوجيا التعليم لمساعدة الطلبة في التغلب على هذه الصعوبات، بعد ذلك بُني اختبار في ضوء تحليل الأخطاء من أجل التركيز على المصادر الرئيسية للصعوبة. بعد التحقق من صدق وثبات الاختبار، طُبِق على عينة مكونة من ٢٥ طالب قبل البدء بتجربة طبق فيها الباحث الأساليب التدريسية المعاصرة المبنية على تكنولوجيا التعليم لمدة 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 حققوه. أظهرت نتائج التجربة فاعلية تكنولوجيا التعليم المعاصرة في التغلب على الصعوبات اللغوية، ويتضح ذلك في التحسن الكبير في تحصيل عينة الدراسة على الاختبار البعدي. كشفت نتائج التجربة أيضاً تحسناً هاماً وملحوظاً في فهم أولئك الطلبة للنصوص العلمية. وقدم الباحث في النهاية عدداً من التوصيات والمقترحات لإجراء بحوث مستقبلية.



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 (L1) 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



A picture, it is commonly said, can be worth a thousand words. Pictures seem 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 Chung,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).

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



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





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



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



## **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.





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:

<b>Pre-test</b>	<b>Treatment</b>	<b>Post-test</b>
T 1	X	T 2

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.



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.

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

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			



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 difference  $\alpha < 0.05$  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	$\bar{X}$	$\bar{D}$	$D_{\bar{D}}$	d f	t-value		Level of significance
						computed	table	
Pre-test	35	27.2	18.020	1.240	29	13.020	3.540	0.001
Post-test		45.13						



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 texts, 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 life-like 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





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.



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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