Integrating Computer-Test Taxonomies Technique into Reading Comprehension Sessions of Literary Texts to Assist Struggling Readers- The Case of IRIS College Pupils at Béjaia, Algeria

دمج تقنية التقييم الحاسوبي في حصص قراءة الفهم للنصوص الادبية لدعم القراء ذوي الصعوبات ـ دراسة حالة طلبة مدرسة الجزائر، ببجاية السوسن

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Abstract

This study is an attempt to find a remedial solution to help IRIS college pupils bridge the gaps in understanding literary texts. It concerns itself with the issue of how and to which extent test taxonomies by means of computers can call poor readers' higher comprehension skills to overcome their shortfall in comprehending literary texts. From the assumption that multimedia technologies enhance the visual aspect of the language in question, which is the starting point in the process of reading, we hypothesize that regular tests via computer-based timed readings and computer-based taxonomies of questions may accelerate learners' comprehension rate and promote their reading comprehension proficiency in literary texts. To test the correctness of our hypotheses, we have opted to the experimental method using an analytic, quantitative approach. The outcomes of this project demonstrate the role of a computer-based technology in relieving college pupils' difficulties in bottom-up and top-down reading comprehension skills during literary texts classes. Besides, they show that the major effect of the computer-test taxonomies technique occurs at the levels of macro-skills and comprehension rate as well.

ملخص

هذه الدراسة هي محاولة لإيجاد حل علاجي لمساعدة طلبة مدرسة السوسن على سد الفجوات القائمة في فهم النصوص الأدبية. وتعنى هذه الدراسة بمسألة كيف والى أي مدى يمكن للتقييم عن طريق أجهزة الحاسوب استدعاء مهارات القراءة والفهم لدى القراء ذوي الصعوبات للتغلب على النقص في فهم النصوص الأدبية. وانطلاقا من المسلمة التي تنص على أن تقنيات الوسائط المتعددة تعزز الجانب البصري للغة قيد الدراسة ، والتي هي نقطة الانطلاق في عملية القراءة ، فإننا نفترض أن التقييمات المنتظمة باستخدام القراءات الموقتة بالحاسوب وكذا الأسئلة التصنيفية المطروحة عن طريق شاشة الكمبيوتر قد تسرع من وتيرة الفهم وتعزز إجادة القراءة والفهم للنصوص الأدبية لدى المتعلمين. لاختبار صحة فرضياتنا ، اخترنا الطريقة التجريبية باستخدام النهج التحليلي الكمي. وتظهر النتائج المتحصل عليها في مشروع البحث هذا دور التكنولوجيا القائمة على الحاسوب في التخفيف من الصعوبات التي يواجهها الطلبة في الفهم القرائي خلال حصص الأدب سواء على مستويات الفهم القاعدية البسيطة او العليا المعقدة. بالإضافة إلى ذلك ، فإنها تبين ان التأثير الرئيسي لتقنية التقييمات التصنيفية باستخدام الحاسوب يحدث على مستوى المهارات الكلية وكذا وتيرة الاستيعاب.

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1. Introduction

Reading comprehension denotes one of the cornerstones of literacy in any language learning. Such a complex multileveled cognitive process encompasses various sub-processes and requires an appropriate control over other skills that interact together while comprehending a piece of writing. A wealth of useful information on the nature of reading comprehension (Perfetti, Van Dyke, & Hart ,2001; Pardo, 2004; Van den Broek & Espin, 2012),itscomponents(Davies,1968;Munby,1978;Grabe,1991), theories and approaches (William,1972;Alderson, 2000;Dlpalmer- Weebly,2010), plus interrelations between L1 and L2 reading have been brought to the surface (Fecteau, 1999; Kuhn & Dean,2004; McNeil,2012).Recently, with the implemention of Information and Communication Technologies (ICT) in education, there is a rapidly growing literature on the contribution of technology tools to the quality of teaching/learning, namely the teaching of literary texts during reading comprehension sessions. The nexus of the literature covers differences between traditional reading classrooms and technology-enhanced reading classrooms (Montali & Lewandowski,1996; Baumgartner & Kalz,2004; Redecker,2013), technology tools and strategies that can be incorporated to assist struggling readers in the various classroom contexts(Manset-Williamson et al.,2008; Stearns, 2012) along with the impact of implementing technology devices along with digital-age media and formats into classrooms to aid teachers support learners in solving problems, finding key remedy to poor readers to surmount their comprehension difficulties, and constructing new knowledge and developing reading comprehension skills (National Center to Improve Practice,1998; Voogt & McKenney, 2008; James, 2014).

With respect to the current paper, the purpose of this article is to trace in detail the development of a particular subset of linguistic forms in learners, using computer-based test taxonomies. These forms include reading comprehension skills of literary texts in struggling foreign language learners of English. Our source of interest and motivation for carrying out such a research project originates from the fact that being a teacher at IRIS college urges us to find a solution to our poor readers since after various sessions of observation and a pre-test, we have ended with the conclusion that interpreting and understanding literary texts represent an awkward task for our learners. . Regarding the study significance, we can cite:

a-While the largest majority of investigations spotlight on one of the two variables, reading rate or reading quality, our project harmonizes the level of understanding (how much do our learners understand?) with the rate to access a full understanding of the text (how much time do our learners need to understand the text during timed-readings?) by means of the computer- test taxonomies technique.

b- The computer-test taxonomies technique is a teaching method that involves informal tests of various types of questions taxonomies. These latter help in fostering comprehension skills at various comprehension levels with trivial learner anxiety.

c-The technique we have developed can be used in and out classrooms; hence, it encourages the use of computer technology to become a practice to promote struggling readers' comprehension deficits in literary texts.

d-This paper can provide teachers with a more advanced method to teach and assess learners' comprehension skills. It implies proficiency-based activities and it fosters proficiency-based learning.

Hence, the present study investigates the ways through which and the extent to which the computer-test taxonomies technique can help struggling readers to overcome their difficulties in comprehending literary texts. It speculates that learners who are regularly tested via computer-based timed readings and computer-based taxonomies of questions may accelerate their comprehension rate to comprehend literary texts and foster their reading comprehension proficiency in literary texts. The nature of the research problem and hypotheses dictates the use of an experimental design to check the efficiency of the technique. Eight consecutive tests are used to collect data before, during, and after the experimental manipulation.

The article opens with a literature review of prior studies on the variables under investigation. Next, it details the research major problem, questions, hypotheses, sampling strategy, method, materials, procedures for collecting and treating data, plus ethical considerations and conflict of interest. Later, the experimental manipulation is carried out to test our hypotheses by presenting the participants' results as well as the analysis and discussion of the results in accordance with our objectives, hypotheses , and theoretical background.

2. A Historical Sketch

2.1 The Nature of Reading Comprehension

There is an abundance of research on the notions of reading and reading comprehension as well as their nature and components. The largest majority of these notions are grounded on the assumption that reading comprehension is a multifaceted interactive process. The interaction occurs between the reader, the text, the teacher, and the learning environment (Flynt & Cooter, 1996). This leads us to the evidence that reading is a complex mental activity. According to Çelenk (2001), the intricacy of reading is the result of the different processes it encloses including vision, dubbing, thought, and rendition.. Regarding Goodman's(1970) psycholinguistic standpoint, reading is a dynamic process which requires the reader to build some anticipated ideas about the text he reads then to test them through the existing language prompts. Reading is meaning construction and inferences derivation, which implies understanding and comprehending. Understanding necessitates drawing meaning from the text, pondering it, finding out the reasons, deducing, and evaluating (Güneş, 2000, p. 59).

2.2 Components of the Reading Comprehension Process

Plenty of practical ideas on the elements which act together during the process of reading comprehension have been and still a matter of debate between researchers. During the 60s, novel insights onto thinking and chiefly reading comprehension components have come into sight. Davies (1968) names eight skills involved in understanding a piece of writing: a- Recalling word meanings. b- Drawing inferences about the meaning of a word in context. c- Finding answers to questions answered explicitly or in paragraph. d-Weaving together ideas in the content. e- Drawing inferences from the content. f- Identifying a writer's technique. g- Recognizing a writer's purpose, attitude, tone, and mood. h- Following the structure of a passage.

Yet, Grabe (1991) puts forward further eight skills for an effective reading comprehension process. These are: a- Automatic recognition skills. b- Vocabulary and structural knowledge. c- Formal discourse structure knowledge. d- Content/word background knowledge. e- Synthesis and evaluation skills/strategies. f- Meta-cognitive knowledge and skills monitoring. Indeed, Grabe's vision represents a preamble to a more holistic orientation towards reading comprehension elements. In order to avoid the paradoxes in terms of the nature and the number of the constituents, many researchers have adopted a new orientation. The literature shows consensus on a range of processes such as motivation, reading fluency, phonemic/phonological awareness, working memory, vocabulary, background knowledge, and others (Bomia et al.,1997; Pressley, 2002;Mehigan,2009; McNeil, 2012; Rothlisberger et al., 2013).

2.3 Aspects of the Reading Comprehension Process

Reading comprehension is featured by three critical aspects: cognitive, social, plus cultural. From the outset, researchers on reading comprehension, mainly cognitivists, have focused on the cognitive facets of reading comprehension, and in many cases, they have overlooked the socio-cultural aspects. In other words, cognitive theorists have conceived language learning including reading skills as a cognitive and individual process in which knowledge is constructed by exposing learners to comprehensible input, and by offering them opportunities to both negotiate meaning and receive negative feedback(Claros,2008). Readingcomprehension, then, is not a mere segregated activity within vacuity. Yet, it is carried out for a specific purpose, in a given social context which enriches readers' conception of the meaning of reading or what is meant by being literate. In the

cognitive perspective, however, the role of social factors and contextual determinants is almost fully ignored (Alderson, 2000).

In retrospect, the socio-cultural theory gives more room for social and cultural aspects of language learning, particularly reading comprehension. The theory explains how social interaction and cultural capital contribute to readers' achievements. Therefore, reading is not an individualistic process; it should be taught in social contexts under the guidance of more expertised persons such as parents, peers, and teachers (Lantolf & Thorne, 2006; Yang &Wilson,2006; Zuengler & Miller, 2006; Reza & Mahmood, 2013).

One further aspect of the reading comprehension process, which dictates the healthy environment for readers, is providing them with appropriate cultural knowledge, experiences, and skills. Lapienienė and Mazeikiene (2015) explain that primarily "it is the family's cultural environment that shapes the prospective reader"(p.129) . The cultural capital is the umbrella term for the variety of cultural resources the social actors use during the interaction to nourish readers' cultural abilities and skills. What is more, the cultural capital is founded on a reader's linguistic and cultural competences, knowledge, beliefs, and values (Lapienienė & Mazeikiene,2015). Bourdieu (1986) attributes outstanding characteristics to the cultural capital. To start with, cultural capital is a set of knowledge and learning achievements, education and linguistic skills. Next, it is both consumption and perception of cultural forms and their application to social interaction, lifestyle, and cultural reproduction. Additionally, the cultural capital is categorized into three states: embodied state (cultural activity), objectified state (possessing cultural goods and objects), and institutionalized state (education). In their turn, Yousef, Karimi, and Janfeshan (2014), after a study conducted in Iran, strongly support the belief of reading as informational communicative to transmit meanings of culture and connect generations to each other in the history of civilization.

2.4 Computers to Teach Literary Texts

Teachers of literature can exploit computers in a variety of ways to present their lessons. The crux of using computers to teach literature is in founding a learning environment where a variety of means can be used, such as text, image, sound, plus the possibility of an interaction between the reader and the machine, in order for dynamic learning environments to occur. These, in their turn, will contribute to the application of the latest education theories (βακαλούδη, 2003). In view of that, learners are supposed to have acquaintance with the key functions of computers and the Internet, like hypertext and hyperlinks (the connection between information in a network of multiple meanings) (Malafantis,2012).Teaching literature by means of a computer-based instruction can appreciably contribute to the development of positive conditions for the reception of a literary text in a classroom. Besides, computers can be employed as a tool of exploration and discovery rather than a repository of knowledge from which the learner will learn (Wang & Liu, 2003).

Zainal (2012) posits that the implementation of ICTs including computers to teach literary texts serves as : a- An aid to comprehension. Teachers use ICT tools as a presentation tool to address learner difficulties in comprehending literary texts. b- A way to promote learner response to literary texts. c- A means to promote language awareness such as providing contextualized ways of learning new vocabulary. d-A way to increase learner motivation.

3. The Experimental Manipulation

3.1 Research Agenda

3.1.1 Statement of the Problem

The major problem of this study is: How and to which extent the computer-test taxonomies technique can contribute to the activation of an interactive process of bottom-up and top-down comprehension skills to assist struggling readers overcome their deficits in comprehending literary texts.

3.1.2 Research Questions

a-What is the level (s) at which the contribution of the computer-test taxonomies technique is more apparent: the speed to access comprehension, the micro-skills, or the macro-skills?.

b-What are the conditions that ensure the efficiency of

this technique during reading comprehension sessions of literary texts?.

c-Are the results obtained sufficiently convincing to adopt the computer-test taxonomies technique with college pupils?.

3.1.3 Hypotheses

a- If the learners are regularly tested via computer-based timed readings, they may accelerate the comprehension rate to comprehend literary texts content.

b-If the learners are regularly tested via computer-based taxonomies of questions that activate an interactive process of bottom-up and top-down comprehension levels, they may promote their reading comprehension proficiency in literary texts.

3.1.4 Population and Sample

The population we have chosen to undergo our experiment is the first year college pupils, at the IRIS School, wilaya of Béjaia. The total number of learners who constitute our population is eighty (N=80). For the sample, we have adopted the Probability Sampling method which implies the random selection of applicants from the population of interest. From the probability sampling methods, we have chosen the simple random sampling method. The sample is a subset of forty (N=40) learners, grouped into two different groups of twenty learners (N=20) in each. They are randomly selected, without being aware that they would be the applicants of our research work to avoid Hawthorne and Subject Expectancy effects. Hence, the technique is introduced as a part of the teaching method rather than as an experiment. Group (2) receives the experimental manipulation as it represents the experimental group. Paradoxically, group (4) is the control group which does not undergo any type of experimentation.

3.1.5 Method

Because experimental investigations are chief tools to test the effectiveness of new implemented techniques or strategies, we have employed an experimental method, using an analytic, quantitative approach.

3.1.6 Materials

a-Multimedia laboratories, with a computer for each member of the experimental group.

b- AceReader Pro 8.2 software installed at each computer.

c-Eight (N=8) literary texts from the novel *The Phantom of the Opera* by Gaston Leroux (1910), adapted by H.Q Mitchell and Marelini Malkogianni (2005). Each text is a chapter from the novel which includes twelve (N=12) chapters in whole, with an average of 650 words in each.

d- Eight taxonomies of questions, including top-down and bottom-up questions.

3.1.7 Procedures for Collecting and Treating Data

a-The instructor has designed a diagnostic test (pre-test) for the two groups (2 & 4) of first year college pupils. The test comprises a literary text (chapter one) followed by a taxonomy of questions, on test sheets for the questions as well as the answers. This taxonomy and the next seven ones encompass a variety of questions including micro-skills and macro-skills comprehension questions, that vary from one test to another, keeping the same level of difficulty.

b-For the diagnostic test and all the coming tests, questions that require macro-skills are graded out of twenty (/20) while micro-skills questions are scored out of ten (/10).

c-The time allotted for the reading comprehension of the text is limited to fifteen (N=15) minutes. This entails that the applicants read with a reading rate of 43, 3 words per minute (43,3 wpm), taking into account the research findings in previous studies. Each learner has to write down on his answer sheet the time consumed to comprehend the text.

d-Fifteen(N=15) days later, the instructor has launched the experiment (chapters two, three, four, five, six, seven). The same procedures followed in the diagnostic test are applied. The difference is that with the experimental group, the text, the questions, and the answers are presented on learners' computers, by means of AceReader Pro 8.2 software which

determines also each participants reading speed. However, the control group members have to mention the time consumed in each test on their answer sheets. The instructor has replicated this process five (N=5) other times, with one week interval between each experiment and the next.

e-The AceReader Pro 8.2 program allows the applicants of the experimental group to go back to the text twice after the first reading, with not more than three (3) minutes in each. This permits them to answer questions on the text or to review some details since our purpose is not to test memory abilities but comprehension skills.

f-Two (N=2) weeks after the accomplishment of the experimental stage, the two groups have taken a posttest (chapter eight) to ensure the credibility of the experimental manipulation results.

g-Lastly, the results of the experimental group before, during, and after the application of the computer-test taxonomies technique have been compared with those of the control group.

h- The participants' answers to all the questions are corrected by the program except the section of essay writing and commenting statements which are based on the teacher's assessment.

i-The criteria of assessment include:

▪ Comprehension rate: 00→15 minutes (mins)

▪ Micro-skills (Mic) grades:-grade a: 10/10;-grade b: 05→10/10; -grade c: 00→05/10

▪ M a c r o - s k i l l s (M a c) g r a d e s : - g r a d e A : 20/20;-gradeB:15→20/20;-grade C:10→15/20;

-gradeD:05→10/20;-gradeE:00→05/20.

3.1.8 Ethical Considerations

This research project has been conducted with full compliance of research ethics norms. The research has involved human participants who are college learners of mine in the IRIS College School. Learners' feedback and progress is kept a matter of discussion between only the teacher (the performer of the experiment) and the individual learner. Learners' grades at any phase of the experimental manipulation

are presented incognito in the study. To avoid any kind of undesirable behaviour such as Hawthorne Effect, Subject Expectancy, anxiety, or hesitation, the learners undergo the experiment as a new teaching method rather than as a research project. All data generated or analyzed during this study are included in the article. The data that support the findings of this study are publically available within the paper at hand with no kind of restriction or privacy policy.

3.2 The Pretest

-Date: 24/09/2018

 -Time:08h:00→09h:15 a.m./09h: 15→10h:30 a.m.

-The literary text: Chapter one from The *Phantom of the Opera.*

Table 1

The Experimental and the Control Groups' Profile in the Pretest

Text	Diagnostic Text	
Group 02 (The experimental group)	Percentage of Learners/ Time Consumed	
	100% 15 mins	
	Percentage of Learners/ Level of Comprehension	
	Mic	Mac
	93% b 07% c	02% B 06% C 91% D 01% E
Group 04 (The control group)	Percentage of Learners/ Time Consumed	
	100% 15 mins	
	Percentage of Learners/ Level of Comprehension	
	Mic	Mac
	94% b 06% c	09% C 87% D 04% E

Table 1 above demonstrates that all the members (100%) of the experimental group have consumed the whole allotted time to comprehend the text. Likewise, (100%) of the learners in the control group have spent the 15 minutes to access the comprehension of the text. In relation to the level of comprehension, there is a close resemblance between both groups. Speaking

about micro-skills, the largest majority of group two (93%) have been ranked at level (b) while a tiny percentage (7%) has got level (c). Similarly, (94%) of the participants in group four have obtained level (b) and only (6%) level (c). Furthermore, the applicants in either group show a little difference at the level of macro-skills. The experimental group has four distinct levels: (2%) level B, (6%) level (C), (91%) level D, plus (1%) level E. The control group has three different levels: level (C) with (9%), level (D) with (87%), and level (E) with (4%). These results mirror the fact that the shortage in reading comprehension skills of literary texts is prominent in our sample; hence, the need for a remedial solution is critical.

3.3 The Experimental Stage

Dates:

08/10/2018-15/10/2018-22/10/2018-29/10/2018–05/11/2018-12/11/2018

-Times:08h:00→09h:15a.m./09h:15→10h:30   a.m.

-The literary texts: Chapters two, three, four, five, six, seven from The Phantom of the Opera.

Table 2

The Experimental and the Control Groups' Profile during the Experimental Stage

Texts	Text 01		Text 02		Text 03	
Group02 (The experimental group)	**Percentage of Learners/ Time Consumed**					
	100% 14 mins		97% 14 mins 03% 12 mins		91% 12 mins 09% 11 mins	
	Percentage of Learners/ Level of Comprehension					
	Mic	**Mac**	**Mic**	**Mac**	**Mic**	**Mac**
	95%b 05%c	18%C 76%D 06%E	03%a 97%b	23%C 77%D	06%a 94%b	08%B 17%C 75%D
Group04 (The control group)	**Percentage of Learners/ Time Consumed**					
	100% 15 mins		100% 14 mins		93% 14 mins 07% 13 mins	
	Percentage of Learners/ Level of Comprehension					
	Mic	**Mac**	**Mic**	**Mac**	**Mic**	**Mac**
	97%b 03%c	08%C 92%D	98%b 02%c	06%C 94%D	100%b	10%C 90%D

Text 04		Text 05		Text 06	
Percentage of Learners/ Time Consumed					
80% 12 mins 20% 10 mins		75% 11 mins 25% 09 mins		71% 11 mins 29% 09 mins	
Percentage of Learners/ Level of Comprehension					
Mic	**Mac**	**Mic**	**Mac**	**Mic**	**Mac**
08%a 92%b	10%B 29%C 61%D	11%a 89%b	12%B 31%C 57%D	12%a 88%b	13%B 37%C 50%D
Percentage of Learners/ Time Consumed					
88% 13 mins 12% 12 mins		82% 13 mins 18% 12 mins		81% 13 mins 19% 12 mins	
Percentage of Learners/ Level of Comprehension					
Mic	**Mac**	**Mic**	**Mac**	**Mic**	**Mac**
98%b 02%c	02%B 28%C 70%D	02%a 98%b	03%B 31%C 66%D	04%a 96%b	03%B 35%C 62%D

Table 2 demonstrates learners' speed to access comprehension and the quality of their understanding in six (N=6) consecutive literary texts. The first time after the implementation of the computer-test taxonomies technique during reading comprehension sessions, the experimental group has shown a kind of advance comparing to the control group. The participants' speed to grasp the meanings presented in the first text is almost similar in both groups, that is 14 mins for the experimental group and 15 mins for the control group. However, noticeable progress appears with the experimental group in the quality of comprehension, chiefly at the level of micro-skills. The largest majority of group two (95%) have got level (b) in the questions which have required micro-skills and only a small number (5%) have got level (c). Macro-skills questions classify the experimental group into three distinct categories: (18%) category (C), (76%) category (D), and lastly (6%) category (E). Like the experimental group, the control group has been ranked at grades (b) with a percentage of (97%) and (c) with (3%) when the bottom-up models of thinking are required. In relation to top-down comprehension skills, a slight development is made: (8%) level (C), (92%) level (D), yet (0%) for level (E).

In text two, the time consumed by both groups is between 14 and 12 minutes. A new category emerges in group two where (3%) of the learners have consumed 12 mins while almost all of them (97%) have spent 14 mins. On the other hand, the whole control group has spent 14 mins to assimilate the text content. Concerning the level of comprehension, the experimental group shows considerable progress in both micro and macro-skills. In micro-skills, (3%) of the applicants have reached level (a) and the rest (97%) have got level (b). Regarding macro-skills, there (23%) of the applicants with level (C), (77%) with level (D), with the absence of level (E). The control group, however, demonstrates little advancement in micro-skills comparing to the first text, that is (98%) level (b) and (2%) level (c). With reference to macro-skills, the control group has witnessed decrease with (2%) in level (C) yet increase with (2%) in level (D), which can be related to learners' physical or psychological state.

Increasingly and incessantly, group two continues its progress in both the time consumed and the level of comprehension in text three. Nearly all the participants (91%) have completed the understanding of text three in 12 mins, yet (9%) have needed only 11 mins. From the other side, the control group shows a slight progress when two categories appear: the first category (93%) has spent 14 mins to accomplish the reading comprehension of the text and the second category (7%) has needed 13 mins. A twofold of the participants of group two with grade (a) in text two, that is (6%) have emerged in text three whilst others (94%) have obtained level (b) in questions that require bottom-up skills. In questions that entail top-down skills, an apparent progress is noticed when (8%) of the learners have reached level (B), (17%) level (C), and the percentage of level (D) learners has decreased to (75%). Group four has also made a kind of progress in both types of skills. In bottom-up skills, there is a progress with (3%) where (100%) of the applicants have got level (b). In top-down skills, the applicants have made an advancement by increasing the percentage of level (C) learners to (10%) while others (90%) have obtained level (D).

Text four strongly illustrates the effect of the computer-test taxonomies technique on the experimental group's reading comprehension skills. A percentage of (80%) of the participants have assimilated text four content in 12 mins and (20%) have completed the task in 10 mins. On the other side, the frequent practice of comprehension taxonomies on regular intervals may have contributed to the control group's development as (88%) of the control group have consumed 13 mins to understand text four and (12%) have required 12 minutes. The achievements of the experimental group extend to encompass comprehension skills as well. Referring to micro-skills, (8%) have obtained level (a) and (92%) level (b). In macro-skills, the candidates in the experimental group have made further advance where (10%) have got level (B), (29%) level (C), and (61%) level (D). The control group, however, has regressed with (2%) comparing to text three in micro-skills. There are (98%) who have got level (b) and (2%) level (c). This may be attributed to physical, psychological, or questions issues. Yet, this subset has continued its average progress by having (2%) of the learners in category (B), (28%) in category (C), plus (70%) in category (D).

Again, text five results reveal the significance of our intervention by means of the computer-test taxonomies. The reading speed of the experimental group has increased to 09 mins by (25%) of the experimental subset and 11 mins by the rest (75%). In their turn, the participants in the control group have made an advance of (6%) when (18%) of them have accomplished the reading comprehension of text five in 12 mins whilst the remainder (82%) have consumed 13 mins. Once more, the applicants in group two have proved noteworthy progress in comprehending the texts. There are (11%) who have got level (a) and (89%) level (b) in micro-skills. Besides, level (B) learners have increased to (12%), level (C) to (31%); nonetheless, level (D) candidates have decreased to (57%) when (4%) of them have attained level (C). In their turn, the control group applicants have made steps further in micro-skills since a new category comes out, which is category (a) with a percentage of (2%), plus category (b) with a percentage of (98%).

In macro-skills, the control group progress is modest in comparison to the experimental group. There are (3%) who have obtained level (B), (31%) level (C), plus (66%) level (D).

To close the experiment, the applicants have taken test six, on chapter seven from *The Phantom of the Opera*. The reading rate of group two varies between 11 and 09 mins, (71%) of the learners have needed 11 mins to assimilate the content of text six while the other (29%) have required 09 mins. Indeed, these reading rates differ from those of text five only in the percentage of learners at each rate. Referring to group four, learners' speed rate is steady starting from text four till text six; nevertheless, the percentage of candidates at each rate differs from a text to another. In text six, (81%) of the participants have accomplished the understanding of the text in 13 mins and the rest (19%) have done the task in 12 mins. Learners in the experimental group have reached the percentage of (12%) for level (a) and (88%) for level (b) in bottom-up skills. The results of the experimental group in questions on top-down skills divide the applicants into three levels: (13%) level (B), (37%) level (C), plus (50%) level (D). As it is noticed, these outcomes may reflect the critical role the computer-test taxonomies technique plays in developing learners' achievements either in the time consumed to access text comprehension or the level of comprehension. Considering the results of the control group, the learners keep on their gradual progress by attaining a percentage of (4%) in level (a) and (96%) in level (b) in micro-skills; in addition, there are (3%) who obtained level (B), (35%) level (C), plus (62%) level (D) in macro-skills. De novo, the regular, frequent practice of various questions taxonomies may have contributed to the control group's development in the comprehension of literary texts.

3.4 The Posttest

-Date: 26/11/2018

-Times: 08h:00→09h:15 a.m./09h:15→10h:30 a.m.

-The literary text: Chapter eight from *The Phantom of the Opera*.

Table 3

The Experimental and the Control Groups' Profile in the Posttest

Text	Post Text	
	Percentage of Learners/ Time Consumed	
Group 02 (The experimental group)	68% 11 mins 32% 09 mins	
	Percentage of Learners/ Level of Comprehension	
	Mic	Mac
	13% a 87 % b	14% B 40% C 46% D
	Percentage of Learners/ Time Consumed	
Group 04 (The control group)	83% 13 mins 16% 12 mins 01% 11 mins	
	Percentage of Learners/ Level of Comprehension	
	Mic	Mac
	06% a 94% b	03% B 37% C 60% D

After the accomplishment of the experiment, the participants in both groups have undergone a posttest. In the table above, the highest speeds the experimental group has reached are between 11 and 09 minutes, which are similar to those of text six in the experimental stage. However, there is a difference in the percentage of learners in each period of time. More than half (68%) of the candidates in group two have achieved their reading comprehension in 11 minutes, and a proportion of (32%) have assimilated the text in 09 minutes. Likewise, group four shows resemblances to text six in the time consumed, but differences in the percentage of learners in each period. There are (83%) who have spent 13 minutes to understand the text, (16%) who have required 12 minutes, and only (1%) who has spent 11 mins. When speaking about micro-skills, we notice a difference with (1%) in the experimental group's results comparing to text six, that is (13%) level (a) and (87%) level(b).But, they continually and significantly develop their macro-skills where we find (14%) with grade (B), (40%) with (C), and (46%) with (D). The feedback of the control group either in micro or

macro-skills illustrates little advance. There is a large majority (94%) graded as (b) and a small minority (6%) as (a). In questions of sharper comprehension skills, three distinctive classes exist, including: (3%) level (B), (37%) level (C), and (60%) level (D). Indeed, the experimental group's outcomes in the posttest are indicators of the positive contribution of the computer-test taxonomies technique to struggling learners in the reading comprehension of literary texts, and they sustain the results obtained during the experimental stage as well.

4. Discussion and Analysis of the Results

All the way through the experimental manipulation, the findings have correlated with the existing studies, answered the research questions, and sustained our hypotheses. To set the stage, the regular timed readings have developed the control group as well as the experimental group's comprehension rate. Yet, the timed readings by means of computers have significantly accelerated the experimental group comprehension rate comparing to the control group. The difference in both groups accomplishments may be due to the influence of the computer-test taxonomies technique. This latter may have pushed the readers in the experimental group to make extra efforts to enhance their reading speed given that computer-assisted instruction promotes learners' engagement and motivation, plus it aids teachers to make further literature-based connections which are more amusing and appealing to learners (Liu,2016). The contribution is clearly perceptible during and after the intervention of the technique. Therefore, the outcomes sustain the hypothesis that states: "If the learners are regularly tested via computer-based timed readings, they may accelerate the comprehension rate to comprehend literary texts   content".

In relation to micro and macro-skills, there is an algorithmic development in group two achievements starting from the pretest till the posttest . As we have seen, the timed-readings by means of computers have accelerated learners' comprehension rate which, in its turn, may have fostered micro-skills from the time when reading rate is one cornerstone of bottom-up abilities. These latter may have interacted with

macro-skills and supported them to prop-up learners' understanding of each text.   Such conclusions maintain the second hypothesis which posits that: "If the learners are regularly tested via computer-based taxonomies of questions that activate an interactive process of bottom-up and top-down comprehension levels, they may promote their reading comprehension proficiency in literary texts".

Group four, however, has kept the same average rhythm of progress in both bottom-up and top-down comprehension skills. In addition to the practice effect of informal tests and timed-readings, there may be also the impact of complementary interrelation between micro and macro- skills, which has allowed a kind of improvement in the control group's achievements. The improvement can be significant, average, or poor depending on the nature of interaction as well as the degree of competency in either type of skills (micro and macro).

5. Conclusion

In this article, testing our two hypotheses via an experimental manipulation lies at the heart of the discussion. At the outset, we have provided a literature review of the main notions and concepts upon which the body of this study has been constructed. Next, we have introduced the research agenda which has detailed the research major problem, sub-problems, hypotheses, approach and method. It has also elucidated the sampling method, plus the procedures for collecting and treating data.

Subsequently, we have launched the experiment where the computer-test taxonomies technique has been applied during reading comprehension sessions of literary texts. All through the experimental manipulation, the intervention of the technique has proved efficiency and resulted in an influential reading comprehension process with group two learners (experimental group). The technique has appreciably affected how much time our applicants need to comprehend literary texts and how much they understand. The conditions under which the technique should be conducted to ensure its efficiency include: adopting the interactive approach of bottom-up and top-down skills, integrating computers, regular

informal testing, timed readings, plus taxonomies of various types of questions.

The foremost effect of the computer-test taxonomies technique has occurred at the level of the speed to access comprehension as well as the macro skills since these two have represented the major shortfalls of our participants in understanding literary texts, right from the beginning of this investigation. Therefore, the results obtained are sufficiently convincing to adopt the computer-test taxonomies technique with college pupils.

Although the results of the experiment maintain the hypotheses established at the beginning of the study, there are some potentially important implications based on existing findings. We believe that teachers as well as learners should be well-trained on the use of software programs before implementing them during reading comprehension sessions in order to save time, to avoid the misuse of the software, and to realize the intended objectives of the course. Teachers should be aware of the effects of text length and function on comprehension. Therefore, they are required to modify the computer-test taxonomies technique procedures according to the text size and genre. To create motivation, second and foreign language teachers need to select text samples that match the needs and the interests of their learners. Learners with reading disabilities (they read slowly, letter by letter or word by word) should be supported with remedial reading tasks that enable them to read fluently since word by word reading undermines comprehension.

Indeed, to enrich the current research project, it is of the utmost priority to conduct further studies on the extent and the aspects of the contribution of the computer-test taxonomies technique to other types of texts such as expository, argumentative, cause-effect,...etc. It is also recommended to accomplish comparative studies on the degree of effect of the technique on learners' progress in understanding each type of texts.

Conflict of Interest

This research work is free from any sort of potential conflict of interest.

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