

# The Effects of Internet Reciprocal Teaching on EFL Students' New Literacies of Online Comprehension and Self-Efficacy

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## Abstract

This study examined the effects of Internet Reciprocal Teaching (IRT) on improving EFL secondary students' new literacies of online research and comprehension and self-efficacy on Internet. 133 students were assigned randomly to two experimental groups ( $n = 68$ ) and two control groups ( $n = 65$ ). The experimental groups' students received Internet reciprocal teaching instruction for 12 weeks; meanwhile, the control groups received regular reading instruction. Two formats of Online Reading Comprehension Assessment (ORCA) were used to assess students' reading comprehension before and after the experiment. A survey for Internet use was also administered to measure changes in students' frequency of Internet use and self-efficacy on Internet before and after the treatment. Independent samples t-test results of the ORCA posttest showed a significant difference between the experimental and control groups on the overall online reading comprehension and its four sub-skills in favor of the experimental groups. Moreover, comparing the results of the experimental and control groups on the survey after the experiment revealed that students of the experimental groups outperformed students in the control groups in self-efficacy on Internet but not on the frequency of Internet use. Pearson product-moment formula indicated that there was a significant relation between self-efficacy and reading comprehension. In addition, readers' self-efficacy was different with their proficiency levels. The study demonstrated that IRT has positive effects on improving

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students' new literacies of online research and comprehension as well as their self-efficacy on Internet use.

**Keywords:** Internet Reciprocal Teaching, new literacies of online research and comprehension, self-efficacy, EFL students.

## فاعلية التدريس التبادلي عبر الانترنت علي المهارات الجديدة لمحو الأمية المعلوماتية للفهم عبر الانترنت وفاعلية الذات للطلاب الدارسين للانجليزية كلغة أجنبية اميرة دسوقي على

يدرس البحث الحالي فاعلية التدريس التبادلي عبر الانترنت علي تنمية المهارات الجديدة لمحو الامية المعلوماتية للبحث والفهم عبر الانترنت وفاعلية الذات لدى طلاب المرحلة الثانوية الدارسين للغة الانجليزية كلغة أجنبية. وقد شارك في الدراسة 133 طالبا من 4 فصول تم تقسيمهم عشوائيا الي مجموعتين تجريبيتين (68 طالبا) ومجموعتين ضابطتين (65 طالبا). وتم تدريس المجموعات التجريبية من خلال استراتيجية التدريس التبادلي عبر الانترنت لمدة 12 أسبوعا بينما درست المجموعات الضابطة من خلال التدريس التقليدي. وقد استخدم نمطين من الاسئلة من امتحان تقييم الفهم القرائي عبر الانترنت (ORCA) لتقييم الفهم القرائي قبل وبعد التجربة. كما تم تطبيق استبيان عن تكرار استخدام الانترنت وفاعلية الذات في استخدام الانترنت قبل وبعد المعالجة. وقد أظهرت نتائج اختبار "ت" للعينات المستقلة وجود فروق ذات دلالة احصائية بين المجموعات التجريبية والضابطة في الفهم القرائي الكلي ومهاراته الأربعة لصالح المجموعات التجريبية. كما أشارت نتائج مقارنة المجموعات التجريبية والضابطة علي التطبيق البعدي للاستبيان الي تفوق طلاب المجموعات التجريبية علي الضابطة في فاعلية الذات في استخدام الانترنت وليس في تكرار استخدام الانترنت. كما أسفر معامل ارتباط بيرسون عن وجود علاقة بين فاعلية الذات والفهم القرائي. وعلاوة علي ذلك، تباينت فاعلية الذات باختلاف مستوي التمكن. وعليه، فقد أثبتت الدراسة فاعلية استراتيجية التدريس التبادلي عبر

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الانترنت علي تحسين المهارات الجديدة لمحو الأمية المعلوماتية في البحث والفهم عبر الانترنت وتنمية فعالية الذات في استخدام الانترنت. **الكلمات المفتاحية:** التدريس التبادلي عبر الانترنت، المهارات الجديدة لمحو الأمية المعلوماتية للفهم عبر الانترنت، فعالية الذات، الطلاب الدارسين للانجليزية كلغة أجنبية.

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## **Background and Research Problem**

### ***A. New Literacies of Online Research and Comprehension.***

With the development of new literacies theory and research, online reading comprehension has been perceived as a “problem-based inquiry process” that encompasses new skills and techniques for the effective use of the Internet (Leu et al., 2004a). Coiro (2009) defines these skills as: a) evaluation and inferences of searched results; b) locating information and navigating within a website; c) checking sites for reliability and validity; and d) summarizing and synthesizing information into new knowledge to be conveyed to others. Leu et al., (2004a) define new literacies of the Internet as the skills and strategies necessary to use the Internet and ICTs skillfully to promote personal and professional aspects of lives. Because searching online requires technological skills as well as social practices; the term new literacies of online research and comprehension is more accurate than online reading comprehension and other alternative terms (Kingsley & Tancock, 2014; Leu, et al., 2004a). Therefore, “new literacies of online research and comprehension” was used by the researcher of this study to describe students’ skills when reading online.

There are five components of new literacies of online research and comprehension. Taboada and Guthrie (2004) point out that reading online should start with a question or problem in the mind of the reader. The skill of locating

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information is necessary for reading on the Internet. Locating information requires a complex set of skills such as generating keyword search strategies, reading search results to spot the most relevant to the search topic, and scanning webpages to locate related information. Readers also need to critically evaluate information online for its accuracy, reliability, and bias. Coiro (2007) specifies five types of evaluation that occur during reading on the Internet: evaluating understanding, relevancy, accuracy, reliability, and bias. Effective use of Internet needs the ability to synthesize information from multiple resources. Readers need to communicate and share findings with others via different tools (email, instant messages, blogs, social networks, wikis, discussion boards, Google Docs, video conferencing, chats) and each tool requires special techniques for successful use.

However, learners face some challenges when reading online due to different characteristics of online versus offline reading. Unlike printed materials, online texts might not undergo peer-reviewing or editing processes; therefore, online materials need to be evaluated for reliability. The second obstacle is that the Internet is full of immense amount of information that makes it difficult for readers to locate accurate information unless they use effective search strategies (Pirece, 1998; Dede, 2000; Azevedo & Cromley, 2004; Bulger, 2006; cited in Robbins, 2010). Third, multimedia elements in online reading such as graphics, hyperlinks and videos require special skills to interpret and process; otherwise, it can distract readers' attention and decrease comprehension (Kerr & Dworet, 2003; Mayer & Moreno, 2003; Leu et al., 2004; Coiro, 2005; cited in Robbins, 2010). Fourth, lack of adequate Internet literacy instruction on the part of the teacher contributes to learners'

shortage of online search strategies. According to Pierce (1998), students need enough time to practice using these skills to be efficient in online search.

In addition, Pierce (1998) found that high school students suffered from these problems when they encounter online inquiry tasks: a) inadequate preparation before using the Internet; b) ineffective use of search techniques like Boolean logic or keyword searches; c) inability to locate relevant information from increasing amount of information; and d) difficulty in evaluating information for reliability and accuracy. Students' failure to perform these tasks makes it necessary to teach these new literacies to students besides providing them with opportunities for application and follow-up. New Media Consortium (2007) concluded that students have to develop skills of navigating and searching, critical thinking, and evaluation to grasp the benefits of online information. Salend (2005) recommends that students be taught strategies to scrutinize, evaluate and synthesize online information and relate information in one website to other online or offline sources.

### ***B. Internet Reciprocal Teaching.***

Internet Reciprocal teaching (IRT) is based on Reciprocal teaching (RT) Model; which develops strategies for reading offline from printed materials (Palincsar & Brown, 1984). The first model of IRT was originated from the taxonomy of online reading comprehension strategies that is resulted from the analysis of the first year of TICA (Teaching Internet Comprehension to Adolescents) project (Ieu, et al., 2006). Implementing IRT in EFL context, involves students in the authentic activities and fruitful discussions; encourages them to use the appropriate searching strategies related to certain content; provides students with modeling of the strategies and support from teachers and peers; and engages students as active participants to collaborate and learn at their pace.

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Whereas RT focuses on four strategies: predicting, questioning, clarifying, and summarizing; IRT emphasizes questioning, locating information, evaluation, synthesis, and communication. Both models provide scaffolding within students' ZPD (Zone of Proximal Development) during instructional phases; starting from direct explicit instruction where teacher models basic skills moving to collaborative exchange and implementation of these skills during online reading tasks. The final stage is the individual performance that contributes to the efforts of other peers to create collaborative projects (Palincsar & Brown, 1984). In addition, both models call for the use of metacognitive strategies and self-regulated reading strategies to search online texts (Coiro, et al., 2007; Cho & Afflerbach, 2015). While RT can be applied with small groups of students, IRT can be used with larger number of students. IRT provides more gradual release of responsibility through three stages in which students start with simpler tasks to the more complex. IRT is created for online reading of different genres. RT is limited to reading printed expository texts (Leu et al., 2008). IRT model has three phases. Phase I is teacher-led instruction; where teacher models and demonstrates fundamental Internet strategies, classroom routines, and group work procedures. The teacher uses think-aloud to facilitate whole-class participation. When most students master the learned skills, the teacher can move to Phase II. In this second phase, collaborative modeling of online reading comprehension strategies takes place. Students are presented with lessons containing common problems that require implementation of online reading comprehension strategies to locate and evaluate information then use appropriate techniques to synthesize and communicate information via e-tools. The responsibility is shared by students with the help

and guidance of the teacher. Tasks should move from more-structured to less-structured activities. In phase III; independent Inquiry phase, students work individually or in small groups while the teacher is the facilitator of online strategy use. Students use strategies learned in phase II to communicate their findings through appropriate communication tools to students outside their class, school or worldwide through collaborative projects (leu, leu& Coiro, 2004b).

### *C. Self-efficacy.*

More emphasis was given to affective domains that affect learners' reading comprehension such as student's motivation, self-efficacy and attitudes. Research investigated learners' self-efficacy and its effect on skill acquisition, academic achievement, task persistence and task choice. Studies proved that high self-efficacy positively affects language learning. It was found that the higher the self-efficacy, the higher the motivation, persistence and engagement to accomplish academic tasks. (Schunk & Pajares, 2002, Linnenbrick & Pintrich, 2003; cited in Ghabdian & Ghafournia, 2016).

To succeed in academic settings, learners need to enhance their reading comprehension self-efficacy (Demirel & Epeçan, 2011). Bandura (1997) defines self-efficacy as one's belief in his/her capacity to organize and perform actions that are required to the achievement of certain outcomes. It entails learners' judgments of their abilities; the perceived self-efficacy, rather than the actual abilities. Therefore, self-efficacy for online learning can be defined as the learners' confidence in producing tasks in technology-mediated contexts and the belief in their abilities to use the internet effectively.

Self-efficacy can be predictive of learners' success based on their strategy use and the learning methods used to achieve

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learning outcomes (Zimmerman, 2000). Oxford (1990) points out that learners' prior knowledge and self-beliefs of their ability to learn a second language influence the way they use learning strategies to implement learning tasks. Therefore, learners with similar levels of knowledge and skills might exhibit varying levels of achievement based on how strong or weak self-efficacy is. Similarly, some learners might fail to show behaviors that actually match their actual abilities/capabilities (Bandura, 1997). He also believes that high self-efficacy increases learner's persistence to tackle challenging tasks such as reading for comprehension.

To evaluate self-efficacy, three aspects should be considered: learner's personal self-efficacy that affects the control over learning tasks and success of performing academic activities; teachers' efficacy and their confidence in facilitating learning as self-efficacious teachers contribute to the learner's success by providing them with reading strategies to improve their comprehension and; and collective self-efficacy on the school and the belief in its role to develop the learning process (Demirel & Epçagan, 2011).

### **Previous Studies**

A number of studies examined the effect of IRT or online reading instruction on students' reading comprehension. For instance, Tara and Grabner-Hagen (2015) explored in their quasi-experimental study the effect of planned intervention curriculum on 418 elementary students' 21<sup>st</sup> century online research skills. Findings showed that the experimental group showed significant improvement in online research skills from the pretest to the posttest of the from pre and post Online Reading Comprehension Assessment (ORCA) Elementary-Revised test in favor of the posttest in locating and synthesis information but not on critical evaluation of online materials.

Similarly, Huang and Yang (2015) explored how two different types of online remedial reading instructions (explicit teaching before reciprocal teaching (ET-RT) and direct instruction (DI) affect reading comprehension, motivation, and self-efficacy of 36 students. Findings revealed that ET-RT improved students' reading comprehension and self-efficacy more than DI. Analysis of survey showed reduction of anxiety and increase in interest in reading of students taught by ER-RT.

Colwell et al., (2013) explored IRT as a model to improve digital literacy in middle school students. Results showed open-ended inquiry projects were effective for training students to practice strategies for locating and critically evaluate information online. Students showed preferences for using these strategies when working collaboratively than individually.

Likewise, Leu and Reinking (2010) investigated IRT effect on online reading comprehension of middle grade students. Comparison of online reading comprehension of students in the treatment group to their counterparts in the control group revealed a significant improvement in online reading comprehension in favor of the former.

Robbins (2010) in his mixed methods study examined the effect of IRT on online reading comprehension of seventh grade students in three English Language Arts classes with high-incidence disabilities in inclusive settings. Quantitative data were collected (ORCA-Iditarod) and the Survey of Online reading. Qualitative data from verbal protocols and interviews were analyzed to triangulate quantitative data. Results indicated a significant improvement in students' scores in the post intervention of ORCA-Iditarod in favor of the treatment group; but no differences were found between students with disabilities and without disabilities. Students in the treatment group showed increased self-efficacy of reading online.

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Furthermore, some studies have explored the relation of self-efficacy and foreign language learning (Mills, Pajares, & Herron, 2007, Hsieh & Schallert, 2008; Wang, Spencer, & Xing, 2009; Hsieh & Kang 2010; Tilfarlioğlu & Cinkara, 2011; Khajavi & Ketabi, 2012; cited in Ghabdian & Ghafournia, 2016), but few studies explored the relation between self-efficacy and reading comprehension. Research proved that high self-efficacy in reading correlated positively with learner's motivation and engagement in reading (Wigfield, et al., 2004).

Naseri and Zaferanieh (2012) investigated the relationship between reading self-efficacy, reading strategy use and reading comprehension of 80 Iranian EFL students. Analysis of the data from Michigan Reading Comprehension Test, self-reported reading strategy use questionnaire, and reading self-efficacy questionnaire showed that there were significant positive correlation between reading self-efficacy and reading comprehension and a correlation between reading self-efficacy and reading strategy use.

A study by Solheim (2011) explored the effect of self-efficacy in reading on reading comprehension scores. A sample of fifth graders, who studied fiction and non-fiction texts, took part in this study. Results showed that self-efficacy in reading can strongly predict learners' scores in comprehension. In addition, the study hypothesis –that students with low self-efficacy have difficulty coping with difficult reading tasks especially in test situations- was maintained.

Shang (2011) studied the relation between proficiency level and reading strategy use. It was found that there was a positive correlation between reading strategy use and self-efficacy.

In their study, Kargar and Zamanian (2010) investigated the correlation between self-efficacy and reading comprehension strategies of 50 EFL Iranian students. Two questionnaires; one of general self-efficacy and the other of reading strategy use were carried out. Findings showed a positive correlation between study variables. However, gender differences proved to be not significant on reading comprehension strategies and self-efficacy.

Nevil (2008) explored how reading self-efficacy affects reading achievement of 80 students in school in North Central Pennsylvania. He concluded that reading self-efficacy reflected students' reading achievement.

This conclusion is consistent with Barkley (2006) who explored the self-efficacy of 400 students in middle school and how it correlates with reading comprehension. Results of a subtest utilized to assess reading comprehension showed that students' self-efficacy about prior knowledge and graphic organizers correlated with their reading comprehension positively.

Similarly, Tercanlioglu (2002-2003) investigated the relation among language learning strategies, reading self-efficacy, and reading comprehension of 184 pre-service teachers in English department in a university in Turkey. It was found that there was a correlation between learning strategies and reading efficacy on one hand and a correlation between language learning strategies and reading comprehension on the other hand. There was also a positive correlation between self-efficacy and reading achievement.

The previous studies that investigated the effect of IRT model on reading comprehension and digital literacies of middle-school students showed a significant improvement in students' online research and comprehension. The researchers who explored the relationship between self-efficacy and reading comprehension found a positive correlation between the two variables. Likewise, this quasi-

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experimental study aimed at extending this research by investigating whether IRT model affect secondary school students' new literacies of online research and comprehension as well as their self-efficacy of online reading. To serve the purpose of this study, the researcher addressed the following research questions:

1. What is the effect of IRT model on EFL secondary school students' new literacies of online research and comprehension?
2. To what extent does students' self-efficacy of online reading comprehension correlate with reading comprehension scores?
3. How is IRT associated with changes in students' frequency of use on the Internet?
4. How is IRT associated with changes in students' self-efficacy on the Internet?
5. To what extent does self-efficacy of online reading differ among proficiency levels?

### **Hypotheses**

1. There is a statistically significant difference between the experimental and control group students' mean scores of overall reading comprehension on the ORCA posttest in favor of the experimental groups.
2. There is a significant relationship between students' self-efficacy and their online research and comprehension.
3. There is a statistically significant difference between the experimental and control group students' mean scores on the frequency of Internet use in favor of the experimental groups.

4. There is a statistically significant difference between the experimental and control group students' mean scores on the self-efficacy on the Internet in favor of the experimental groups.
5. There is a statistically significant difference among the mean scores of the three reading proficiency groups on the ORCA posttest in favor of the high proficiency group.

### **Significance of the Study**

The integration of technology in reading instruction makes research exploring the relationship between motivational variables and online reading comprehension imperative. The current study sought to provide researchers with quantitative indicators of the correlation between self-efficacy and online reading comprehension and how this varies among different levels of students' self-efficacy on online reading. The study also aimed at investigating the effect of using IRT model on EFL students' reading comprehension in online context. Teachers will get insights on how to use IRT in EFL classes to maximize students' benefits of reading online and boost their self-efficacy and motivation. The results of this study will improve students' online reading practices, enhance their attitudes, and save their time and effort when searching and reading online.

### **Method**

#### **Participants**

The participants of this study were four intact classes of first year EFL secondary students at an experimental school in Tanta; Egypt. The study took place in the first semester of the academic year 2016/2017. Having used the quasi-experimental research design, the researcher randomly assigned the classes into 2 control ( $n = 65$ ) and 2 experimental ( $n = 68$ ) groups. All students ranged in age

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from 15 to 16. Students of the two groups were heterogeneous in terms of gender and language proficiency. An online practice test of Cambridge English: Proficiency (CPE) for Reading and Use of English was administered to students prior to the experiment to identify their proficiency level in reading and use of English. Out of the 68 students of the experimental groups; (22) were high proficient, (27) were mid proficient, and (19) were low proficient. As for the control group, (20) were high, (28) were mid, and (17) were low proficient.

### **Instruments**

#### **A. The Online Reading Comprehension Assessment (ORCA).**

There are three formats of ORCA: ORCA-open (the Internet as we know it); ORCA simulation (a closed simulated Internet environment); and ORCA-Multiple Choice. The three formats tackle six topics about health and human body. Students in the seventh grade are familiar with the topics of the test: energy drinks, snacks, video games, and contact lenses. ORCA begins with ten multiple choice questions to check students' prior knowledge of the topic. Students' responses to ORCA Multiple Choices are scored automatically by the system; a mark for each question. Each ORCA assesses four skills of online reading and research: locate, evaluate, synthesize, and communicate information. Each skill is scored out of 4 marks; therefore, the total is 16. The skills are sequenced according to logical rather than linear order except the evaluation items as they appear in order tackling website's author (Maykel, Forzani & Leu; 2014).

Students were asked to read multiple websites about a topic then communicate results in a factious email or class wiki.

The tasks can be attempted in two formats; multiple choice and closed or simulated. For this study, the researcher chose two topics; snacks and video games. For snacks, students took the MC format where they produced an email to fictional School Board President. The second exercise was about video games in a closed format where students posted a fictitious class wiki. The total of the two exercises was 32 marks. The MC test was scored automatically while the closed test was scored by the researcher and another researcher against a rubric provided by the system. Each question was scored following a binary system (0 or 1). The total time of the test was 90 minutes. The inter-rater reliability of the two scorers of the closed format of ORCA was calculated utilizing Cronbach's alpha reliability coefficient. The reliability was 0.97; which indicated a high level of agreement. The two scenarios of ORCA were piloted to a group of secondary school students other than the groups of the present study. To check the internal consistency of the 32-point test, ORCA assessment showed good reliability, with Cronbach's alpha= 0.90. Reliability was high for each student on the two selected scenarios: Snacks (Cronbach's  $\alpha = .88$ ) and Video games (Cronbach's  $\alpha = .83$ ).

### **B. Survey of Internet Use.**

The survey was developed and uploaded to SurveyMonkey.com and the link was sent to students via email a week before the experiment. The survey was designed to examine the differences between the experimental and the control groups on self-efficacy and frequency of Internet use from the pre to the post applications. The survey consists of three sections. Section one was designed to gather demographic information about the participants. This section includes 7 questions, in which students chose the statement that best represents their ability to use the Internet and read online. The second section

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contains 8 question where students rate their frequency and nature of Internet use on a six-point likert scale as follows: Never= one; less than once per week=two; once per week=three; a few times each week=four; once per day=five; several times per day=six. The third section is 29 questions that were divided into four parts according to the skills in ORCA: Locate, evaluate, synthesize, and communicate information online. Students were asked to rate their level of self-efficacy of online skills and strategies from (1) novice; (2) advanced beginner; (3) competent; (4) proficient; and (5) expert. The validity of the survey was measured by being checked by experts in TEFL to establish content validity. The reliability was calculated using Cronbach's alpha=0.98; therefore, the survey is quite reliable.

### **The Intervention**

IRT sessions were carried out once a week (90 minutes) for 12 weeks (18 hours) from October to December 2016-2017. Pre-assessment phase took place a week before the experiment where the ORCA test and the survey were administered to students in the experimental and control groups. A teacher in the school, holding an MA in TEFL, taught the four classes. The experimental group underwent the intervention and were taught using IRT model to read topics relevant to their interest and familiar to their prior knowledge (same topics of their course book). The control groups were taught using the conventional instruction of teaching reading texts from the school textbook (pre-reading, while-reading, and post-reading) and were asked to do some assignments using the Internet and Microsoft Word Processor. The post-assessment phase took place after the 12 weeks at the last week of December.

The teacher received training on the use of IRT and was provided with the lesson plans of the IRT lessons and

tutorials about the target skills. The intervention started with an orientation session in which students became familiar with the objectives of the study. The experiment took place in the school computer lab with 25 computers with Internet connection. Students worked in groups of 4 using one computer. The lab consisted of an LCD projector which the teacher used to present files and videos to the whole class.

The Internet resources were adapted to be culturally suitable, relevant to students' needs and learning styles, authentic, reliable in factual content and presentation, appropriate in subject area and for the age and language proficiency of students, motivating to encourage students to work cooperatively and solve problems, appropriate in length and readability to the students, and attractive containing a variety of media presentation modes. The lessons were representative of the IRT skills and the skills assessed by ORCA test except questioning; which was not assessed by the test. A video tutorial for each skill was created to demonstrate these skills followed by guided practice and discussion.

*Phases of IRT lessons:*

In phase I, the teacher taught the experimental groups basic skills in web searching, navigation, email and wiki use. This usually took the first part of the session (30 minutes). When the majority of the students mastered these skills, phase 2 was implemented (30 minutes). Students were taught strategies for developing questions that suit the audience, purpose, and nature of the task. They learned how to ask or modify questions by narrowing or expanding the focus of the question to reach relevant search results. A single lesson was created for teaching this strategy as a prerequisite for mastering the other skills; however, it wasn't assessed by ORCA. Three lessons were designed to teach students to locate information online using strategies like using appropriate keyword entries, topic and focus, using quotation

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marks for specialized search results, trying synonyms, implementing Boolean operators, search results, skimming and scanning the sites, understanding the meaning of URLs, bookmarking and special search engines for multimedia components, modifying keywords and searches, and predicting information.

Students were taught to critically evaluate online sites for reliability and accuracy. During three sessions, students checked sites for reliability, accuracy, biases, and used techniques to recognize authors' points of views like placing author's name into a search engine. Students were taught how to synthesize information and distinguish relevant and irrelevant information from multiple websites, take notes, paraphrase, and organize information in three sessions. Students synthesize information to showcase relationships and text organization by using online concept mapping or graphic organizers. After synthesis, students were instructed in two sessions to communicate their findings via web 2 tools, address audience properly, edit and proofread, compose and send emails, and post wikis. Same time was allocated to phase 3 (30 minutes); where students implemented the target skills independently to present their findings through an email or a wiki-in this study.

### **Results and Discussion**

#### **A. Results of the ORCA Test.**

The data were analyzed using the (SPSS). In order to answer the first research question, which investigated how IRT affect new literacies of online research and comprehension, data from the ORCA test were analyzed by performing independent samples t-tests to check whether there are any significant differences between the experimental and control groups. Analysis of the results of the ORCA pretest indicated that the control ( $M=13.12$ ) and the experimental ( $M=12.38$ )

groups did not significantly differ on the ORCA pretest ( $t=1.34, p>0.05$ ). As shown in table 1, analysis of ORCA posttest showed that there was a significant difference at the 0.05 level between the experimental ( $M=24.28$ ) and the control ( $M=13.54$ ) groups in the ORCA posttest ( $t= -12.95, p<0.05$ ) in favor of the experimental groups. Therefore, hypothesis 1 was accepted.

Table 1 also presents the performance patterns on the four skills of ORCA on the pre- and post- tests for the groups; students in the experimental groups showed a significant improvement than the control groups from pretest to posttest on the online skills of locating, ( $M_{con.}=2.95; M_{exp.}=6.06; p<0.05$ ), evaluation ( $M_{con.}=3.29; M_{exp.}=6.07; p<0.05$ ); synthesizing ( $M_{con.}=3.43; M_{exp.}=6.00; p<0.05$ ); and communication ( $M_{con.}= 3.86; M_{exp.}=6.15; p<0.05$ ).

Therefore, the experimental groups' students improved their overall reading comprehension as well as the new literacies; locating information, evaluation, synthesis, and communication after the treatment. The three-phase model of IRT scaffolded students' learning of new literacies and enabled them to be more autonomous. Like participants in Leu and Reinking (2010)'s study, participants of the experimental groups in this study outperformed their counterparts in the control groups and achieved a significant improvement in the overall online reading comprehension. Unlike Tera et al., (2015) whose findings revealed that students from the experimental groups showed significant improvement in the posttest of the ORCA Elementary-Revised test in locating and synthesis information but not on evaluation of online materials, findings of this study showed that students improved on the four skills tested by ORCA. Likewise, Cowell et al., (2013) found improvements in the participants' skills of locating information and evaluation.

Table 1.

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*Independent Sample T-test for New Literacies on ORCA Pre- and Post- Tests of the Control and Experimental Groups*

		Control groups (N=65)		Experimental groups (N=68)		Levene's Test for Equality of Variances		t-test for Equality of Means		
New literacies	Test	Mean	SD	Mean	SD	F	Sig.	t	df	Sig. (2-tailed)
Locating information	Pretest	3.29	.897	3.24	.964	.018	.893	.353	131	.725
	Posttest	2.95	.837	6.06	1.573	30.325	.000	-14.297		.000
Evaluation	Pretest	3.57	1.131	3.46	1.165	.238	.627	.421	131	.674
	Posttest	3.29	1.234	6.07	1.722	7.395	.000	-10.743		.000
Synthesis	Pretest	3.17	.782	3.15	.885	.118	.732	.153	131	.879
	Posttest	3.43	1.060	6.00	1.565	8.913	.000	-11.130		.000
Communication	Pretest	4.12	1.008	4.09	1.004	.015	.903	.200	131	.842
	Posttest	3.86	1.008	6.15	1.713	22.742	.000	-9.228		.000
Total	Pretest	13.12	3.125	12.38	3.237	.031	.861	1.34	131	.182
	Posttest	13.54	2.728	24.28	6.246	44.844	.000	-12.95		.000

As for the second research question that sought to identify the relationship between students' self-efficacy and their reading comprehension achievement, Pearson Product Moment was conducted. As shown in table2, the correlation coefficient between the two variables is  $r=.095$ ; which is significant at the  $p=.443$  (2-tailed). Since the correlation is positive, it is postulated that the more self-efficacious the students are, the better their reading comprehension. Thus, the second hypothesis was confirmed.

**Table 2.**  
*Correlation between Self-efficacy and Reading Comprehension*

		Reading comprehensi on	Self-efficacy
<b>Reading comprehensi on</b>	<b>Pearson Correlation</b>	1	.095
	<b>Sig. (2-tailed)</b>		.443
	<b>N</b>	68	68
<b>Self-efficacy</b>	<b>Pearson Correlation</b>	.095	1
	<b>Sig. (2-tailed)</b>	.443	
	<b>N</b>	68	68

As a result, there is a strong relationship between self-efficacy and reading comprehension. This finding is in consistence with Barkley (2006), Kargar and Zamanian (2010), Shang (2011), and Naseri and Zaferanieh (2012) who found positive correlation between reading self-efficacy and reading comprehension.

### **B. Results of the Survey.**

Based on the analysis of the post-administration of the first section of the survey, 15 participants from the experimental groups perceived their overall reading as being very good compared to 12 from the control groups. 39 participants of the experimental group reported that they were average against 37 from the control groups; while 14 participants in the experimental and 16 in the control groups believed that they were not good readers. 17 respondents from the experimental groups and 9 from the control groups indicated that they were somewhat skilled at reading online; whereas 40 from the experimental and 34 from the control perceived themselves as average and 11 respondents from the former

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and 22 from the latter were not good readers. The majority of participants in the experimental and control groups (98%) have computers at home and used them for school assignments and about 96% have Internet connection at home and those who have no Internet often use computer at school.

To answer the third and fourth research questions and compare the data gathered from the survey for frequency of Internet use and self-efficacy on Internet from the groups, independent sample t-tests was employed. The population variances of the groups were equal on the pre administration of the survey on frequency of use ( $t = -.154, p > 0.05$ ) and self-efficacy on the Internet ( $t = -2.85, p > 0.05$ ).

Data analysis of the post-application of the survey results showed that there was no difference on the mean scores of the groups on the scale of frequency of Internet use ( $t = .381, p > 0.05$ ). Therefore, hypothesis 3 was rejected. Data analysis showed that most students in the experimental and control groups (31% to 33%) stated using the Internet to download files, music, and images a few time a week. A fair number of students (22% to 24%) used the Internet to post discussion boards a few times a week. About 31% read about entertainment topics once a day. Nearly 28% used Internet to play online games less than once a week. A good section of students (33% to 35%) searched the Internet for school assignments once a week and the same percentage searched a few times each week. Approximately 43% of students read about topics of interest and current events several times a day. From 48% to 50% of the respondents used chat rooms several times a day and the majority reported using the Internet to access social networks several times a day.

Figure 1 shows the means of the control and experimental groups on frequency of Internet use.

Referring to self-efficacy on Internet use, the groups varied on the scale of self-efficacy in the post-administration of the survey ( $t=-26.429$ ,  $p<0.05$ ). Thus, hypothesis 4 was accepted; as there was a significant difference at the 0.05 level between the groups on the post-application in self-efficacy on Internet in favor of the experimental groups.

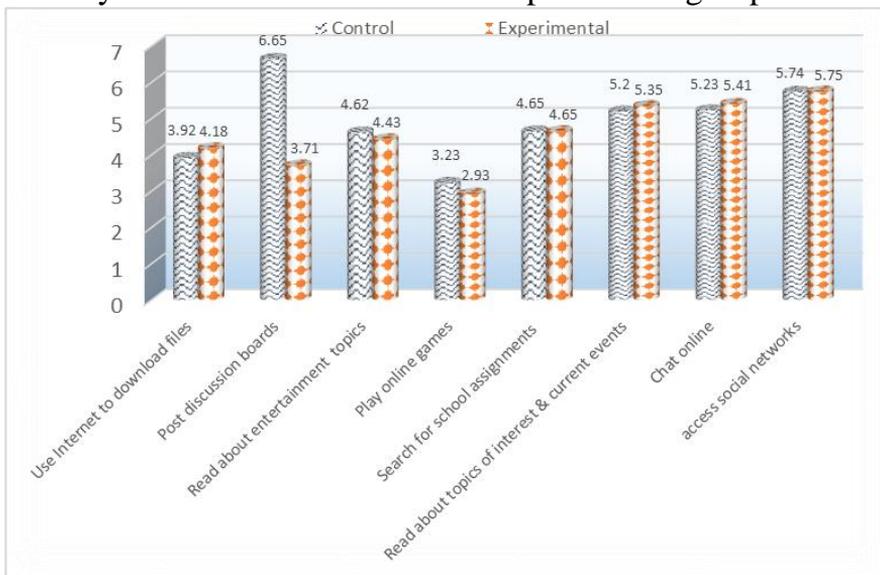


Figure 1. Means of the Control and Experimental Groups on Frequency of Internet Use

Table 3 presents descriptive statistics of students' responses to part 3 of the survey that explored students' self-efficacy on Internet. Concerning locating information, 30.3% of the respondents from the experimental groups said they became expert in locating information in a website, wiki or email compared to 19.1% from the control groups. 26.2% from the experimental to 11.6% from the control groups indicated becoming expert in using appropriate keywords in search engines; whereas 52.1% to 31.5% improved their ability to identify correct website addresses in two different search

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tasks. 46.1% to 13.9% skimmed a website for the main idea professionally. 39.3% participants from the experimental groups (20.2% from the control) enhanced their ability to predict information from media in a website and 41.2% respondents (15.7% from the control) read search engine results effectively to determine the most useful resources from a variety of search results.

Table 3.

*Descriptive Statistics of the Control and Experimental Groups on the Post-Application of Self-efficacy on Internet Scale*

Skill	Group	Item M (SD)	Item M (SD)	Item M (SD)	Item M (SD)	Item M (SD)	Item M (SD)
Locating information (items 1-6)	Con.	3.71 (.914)	1.97 (.984)	2.98 (.599)	3.06 (.704)	2.51 (.868)	2.74 (.940)
	Exp.	4.43 (.654)	4.32 (.701)	4.37 (.751)	4.37 (.771)	4.43 (.698)	4.47 (.701)
Evaluation (items 7-11)	Con.	2.65 (1.110)	1.65 (.1110)	1.78 (.695)	1.72 (.718)	1.98 (.718)	————
	Exp.	4.43 (.676)	4.43 (.676)	4.13 (.790)	3.91 (.876)	4.07 (.816)	————
Synthesis (items 12-16)	Con.	2.51 (.773)	2.51 (.732)	2.22 (.673)	2.78 (.649)	2.14 (.808)	————
	Exp.	4.16 (.822)	4.26 (.785)	4.31 (.738)	4.28 (.709)	4.21 (.873)	————
Communication (items 17-22)	Con.	2.75 (.685)	2.28 (.910)	2.68 (.920)	2.52 (.868)	2.48 (.709)	2.40 (.932)
	Exp.	4.26 (.725)	4.24 (.831)	4.29 (.774)	4.38 (.754)	4.38 (.754)	4.40 (.715)
Communication (items 23-28)	Con.	2.83 (.977)	1.43 (.612)	1.88 (.573)	1.49 (.562)	1.95 (.694)	6.63 (.782)
	Exp.	4.37 (.771)	4.25 (.817)	4.31 (.778)	4.26 (.822)	4.21 (.873)	4.53 (.782)
Communication (item 29)	Con.	2.31 (.883)					
	Exp.	4.56 (.608)					

For the evaluation skill, 29.6%, 22.8%, 36%, 34.7%, and 28.1% respondents from the experimental groups respectively developed their skills of identifying the author of a website, evaluating the author's level of expertise, identifying the author's point of view, evaluating the reliability of a website, and using information about author to evaluate how information in a site is biased. In response to synthesis, most of the respondents in the experimental groups (32.6%) claimed that they became expert in summarizing relevant information from a website, while 31.3% reported that they can summarize information from two or more websites. 35.6% stated that they improved their ability to summarize important information from a website in a search task to develop an argument. 33.7% of the respondents indicated being able to distinguish relevant information from irrelevant information and 28.8% can organize information effectively.

In responding to the items in the survey related to communication, participants of the experimental groups improved by 12.7% in reading emails, 7.1% in attaching documents to email messages, 19.5% in composing and sending well-structured short report of their search in emails, and 13.5% in replying to emails. Nearly 40% to 50% stated being professional and expert in typing correct addresses, including appropriate subject line, and using appropriate greeting in email messages. Most participants (48% to 55%) reported that they improved their ability to make wiki entry in the correct location, include appropriate heading for a wiki entry, compose and post a well-structured short report to research in a wiki, copy and paste text or URL to use in messages, use instant messages to communicate information, and monitor communication of information for audience or voice.

In sum, significant differences were found on the self-efficacy on Internet and not on the frequency of Internet use

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in the post-administration of the survey. This implies that IRT had no effect on students' frequency of using the Internet; whereas the model had influenced students' self-efficacy significantly. As pointed out by Tsai and Tsai (2003) and Tsai (2004), learners' perceptions of the Internet influence their attitudes and performance in Internet-based tasks. By the same token, Robbinson (2010) found a significant improvement in the scores of the students in the treatment group in the posttest of ORCA-Iditarod and an increased self-efficacy of reading online as indicated by the results of the Survey of Online reading. Huang and Yang (2015) concluded that students' reading comprehension, self-efficacy on Internet, and interest in reading have improved more than their partners who didn't receive the treatment.

To answer the fifth research question on whether self-efficacy is different among proficiency levels, descriptive statistic was conducted to calculate the mean scores of the three proficiency levels of students in the experimental groups. Comparing the means showed that, high proficient readers have an average of 30.41( $SD=0.854$ ), mid proficient have an average of 25.74 ( $SD=1.754$ ), while low proficient have an average of 15.11 ( $SD=1.410$ ); which is the lowest means among the groups. This indicated that the high proficient group has the highest means followed by the mid proficient then the low proficient. Then, one-way ANOVA was implemented to identify if there were differences in growth rates for the proficiency levels in reading comprehension and if it was statistically significant (see table 4).

**Table 4.**  
*One-way ANOVA for Readers in Different Proficiency Levels in Reading Comprehension*

	Sum of Squares	df	Mean Square	F	Sig.
<b>Between Groups</b>	2483.398	2	1241.699	619.454	.000
<b>Within Groups</b>	130.293	65	2.005		
<b>Total</b>	2613.691	67			

The result demonstrated that the significance level is (sig. = .000 < .005); therefore, there is a statistically significant difference in the reading comprehension between the different proficiency levels. Finally, Tukey HSD test was used to identify the differentiating groups as demonstrated in table 5.

Checking the mean differences indicated that there was a significant difference between high and mid proficiency levels (4.668, sig. = .000), high and low (15.304, sig. = .000), and mid and low (10.635, sig. = .000). Therefore, self-efficacy is different among proficiency levels; with the high proficiency level have the highest self-efficacy. Consequently, hypothesis 5 was maintained.

**Table 5.**  
*The Tukey HSD Post-Hoc Test for High, Mid, and Low Proficiency Levels*

	(I) levels	(J) levels	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
<b>Tukey HSD</b>	<b>high</b>	<b>mid</b>	4.668*	.407	.000	3.69	5.64
		<b>low</b>	15.304*	.443	.000	14.24	16.37
	<b>mid</b>	<b>high</b>	-4.668*	.407	.000	-5.64	-3.69
		<b>low</b>	10.635*	.424	.000	9.62	11.65
	<b>low</b>	<b>high</b>	-15.304*	.443	.000	-16.37	-14.24
		<b>mid</b>	-10.635*	.424	.000	-11.65	-9.62

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\*The mean difference is significant at the 0.05 level

This finding agrees with Magogwe and Oliver (2007) who found a significant relationship between EFL learners' self-efficacy and their use of language learning strategies/proficiency. Likewise, Nevil (2008) asserted this finding and concluded that reading self-efficacy was affected by students' proficiency in reading. The more efficacious the reader, the better his/her reading achievement is.

### **Conclusion**

This study concluded that IRT was effective in developing the new literacies of online research and comprehension of a sample of secondary school students in an EFL context in Egypt. Students in the experimental groups outperformed their counterparts from the control groups in ORCA posttest in the overall online research and comprehension skill and its sub-skills (locating information, evaluation, synthesis, and communication). The study revealed a positive relationship between self-efficacy and reading achievement. The IRT model significantly influenced students' self-efficacy on Internet; however, no changes were found on the frequency of Internet use before and after the experiment. It was also found that high self-efficacious students performed better than low self-efficacious partners in reading comprehension achievement.

However, the study is limited to 133 participants in EFL context. The small size of the sample makes it difficult to generalize the results; however, it gave insights into implementing same strategy with other EFL students. The study is also limited to IRT skills assessed by ORCA test: locating information, evaluation, synthesis, and communication. Developing questions was not examined in this study. The ORCA test was used as a pre- and post-test to explore the online reading comprehension of the participants.

The results were quantitative; therefore, more qualitative data are needed for deeper understanding of participants' responses. The length of the study was also a limitation; as 12 weeks are not sufficient to evaluate the new literacies of research and comprehension. Longer treatment period is required to get broader results.

### **Implications and Recommendations**

The current results merit greater attention from educators, curriculum designers and researchers. Teachers should be prepared to teach new literacies in their online reading instruction and should participate in opportunities to integrate new literacies in curriculum design. They should also plan lessons to incorporate new online literacies to help students comprehend and communicate information online. Educators have to consider students' attitudes and perceptions of Internet and how they affect their learning outcomes and provide them with relevant scaffolds to improve their performance in tackling Internet-based tasks. This can be performed by training students on the necessary skills prior to the use of the Internet, providing them with opportunities to practice these skills, and designing activities that promote their autonomy as well as cooperation. Furthermore, curriculum designers should integrate Internet reading skills into existing EFL curricula. Designers of online research assessment must pay attention to the age, proficiency level, reliability of test, and classroom time and create tools to expand current measures to assess all new literacies (i.e., questioning).

Future studies are needed to explore effective ways of assessing new literacies of research and comprehension in different contexts. More research in this area must be conducted to investigate methods and models to teach 21<sup>th</sup> century skills to EFL students. This study also makes a call for future research to examine the effect of the affective factors such as motivation, self-regulation, and perception on

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students' performance on Internet-based tasks. The use of qualitative approaches or mixed-methods may present a more thorough picture of learners' perceptions and behaviors on using the Internet. Emerging work should seek to explore instructional practices that successfully improve online reading comprehension skills in EFL classes. This line of research must consider different levels and needs of students. Finally, future research is needed to examine the influence of providing students with opportunities for online collaboration on schools and national levels.

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