

THE RELATIONSHIP AMONG ICT SKILLS, TRADITIONAL READING SKILLS AND ONLINE READING ABILITY

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ABSTRACT

Perspectives from reading and information fields have identified similar skills belong to two different kind of literacy being online reading abilities and ICT skills. It causes a conflict between two research fields and increase difficult of integrating study results. The purpose of this study was to determine which views are suitable for describing the essence of online reading. A path' analysis model was proposed to verify different views. 376 children (4th grade to 6th grade) from three primary schools were recruited as participants. The results show that approximately half of the variance related to online reading ability could be explained by ICT and paper-based reading skills. However, online reading depends less on ICT skills. Paper-based reading skills remain the main basis for online reading.

KEYWORDS

Online reading ability, Item response theory, ICT skills

1. INTRODUCTION

Online information has gradually become a popular reading source over the two decade. Given this trend, issues concerning skills required for online reading and on whether those skills differ from those used for paper reading have been frequently researched. Though most scholars agree that online reading abilities are more complex than paper reading abilities, different definitions have been proposed. Some scholars, who focus on digital environment, define online information processing skills as information and communications technology (ICT) skills/digital literacy/Information literacy (Eisenberg, 2010; Karchmer, 2001). For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) notes that information in the digital environment is not merely passively accepted. People have to develop the capability to find information in plenty of hypertexts, assess its credibility, and decide whether to accept the information, or continue searching for more relevant information (Catts, Lau, Statistics, & Programme, 2008). The ISTE's (International Society for Technology in Education) (2007) digital literacy indicators for elementary school students, include: (1) the capacity to locate, organize, analyze, and integrate vast amounts of information based on ethics; (2) the capacity to appropriately evaluate and select information sources and digital tools depending on the task at hand; and (3) the capacity to process data and report results.

Others believe that online reading required both ICT skills and traditional reading skills (Leu, Kinzer, Coiro, & Cammack, 2004; OECD, 2010; Schmar-Dobler, 2003). In the 2009 PISA online reading comprehension test, the capabilities required for paper reading were still viewed as the definitions of reading ability. Besides those paper reading abilities, formulating keywords, assessing relationships between hyperlinks, selecting high-quality texts from online texts, integrating hypertexts within open textual boundaries, and retrieving specific facts from websites were identified as new skills for online reading. Furthermore, ICT skills, including using site maps and mouse operation such as scrolling on a page, and clicking on a hyperlink, have been defined as online reading skills (OECD, 2011). The redefinition of online reading ability by PIRLS was similar to that by PISA. Original paper-based reading ability definitions created by the PIRLS and e-PIRLS, were retained, though the e-PIRLS highlights differences between paper-based and online texts, with definitions focusing on web page information localization; the inferences of relationships between content and reading purposes; comparisons and connections between content

displayed on multiple web pages to form a general understanding; and the evaluation of credibility, viewpoints, and potential impacts on reader webpage comprehension (Mullis, Martin, & Sainsbury, 2013).

Leu et al. (2015) referred to reading literacy changes brought about by ICTs as "new literacies of online research and comprehension." In this view, online reading within the limits of hypertext, such as email or web pages, is actually very similar to paper reading. The differences between the two lie in the mechanisms required when reading for problem solving and for searching information in the case of online reading. In other words, online reading requires not only traditional reading skills but also skills in searching, evaluating, and integrating information to form a new comprehension that extends beyond the original information. Therefore, they believed that online reading skills include traditional reading skills and ICT skills but differ from both sets of skills. The ORCA online reading comprehension test, which conducted by this view, included locating, evaluating, synthesizing, and writing for communication purposes abilities (Coiro, & Kennedy, 2011). Although the definition of these abilities was not based on traditional reading ability like PISA or e-PIRLS, it was quite similar with ICT skills.

Association with Information-seeking changes traditional definitions of reading ability. Seeking and browsing become two major components of online information processing. Therefore, localizing and navigating the search process, assessing relevant and trustworthy information, and integrating fragmented information obtained through the browsing process are more emphasized in the online reading environment (Henry, 2006; Rouet, Ros, Goumi, Macedo-Rouet, & Dinet, 2011). However, these abilities can also be defined as ICT skills frequently. Ultimately, the overlap between online reading abilities and ICT literacy leads to speculation that two sets of skills are similar. Furthermore, comparable skills that belong to two different forms of literacy also create a conflict between the two different research fields.

Perspectives from different fields have diversified the essence of online reading ability, and different scholars present different perspectives, which make it difficult to integrate and compare the study results. Therefore, it is necessary to determine which view most appropriately defines online reading abilities. If the view that ICT skills are similar to those of online reading holds true, it is no longer necessary to address such issues using different terminology. However, if the view that online reading skills are not equivalent to ICT skills holds true, exploring how much traditional reading abilities and ICT skills are implicated in online reading abilities will help us better understand the essence of online reading skills. In relation to undergraduates, elementary school students need more instruction on online reading skills, which has rarely been investigated. Age can also significantly predict paper-based reading comprehension (Cain, Oakhill & Bryant, 2004; Verhoeven, & van Leeuwe, 2008). In this way, elementary school students were used as subjects.

2. METHODS

2.1 Participants

A total of 384 children from three primary schools in northern Taiwan were recruited as participants. Overall, 121 children were in fourth grade, 115 were in fifth grade, and 148 were in sixth grade. Children diagnosed with specific learning disorders or disabilities were excluded from the study. In the Taiwanese schooling system, children start to learn how to use computers in third grade. Thus, all of the children had at least one year of computer experience.

2.2 Assessment

2.2.1 Chinese Reading Comprehension Test (CRCT)

The student participants were subjected to the Chinese reading comprehension test compiled by Lin and Chi (2002) to measure their paper reading abilities. The test is the normal reference paper test with pencil and is conducted in a group, with split-half reliability of 0.95. The test consists of 12 articles and 100 multiple-choice questions (49 questions for narrative articles and 51 questions for descriptive articles). It tests proficiencies including phonological processing, semantics, syntax, the understanding of basic facts,

comparative analysis, integration and interpretation, and inference, with one point for one correct answer on one question and a perfect score of 100 points.

2.2.2 Chinese Online Reading Comprehension Test (CORT)

This online reading ability test that was constructed according to the item response theory (IRT), was developed by the authors to measure the online reading ability (Liu & Ko, 2015). The test contains 25 questions (3 coordination questions and 22 multiple-choice questions) divided into the 3 cognitive aspects of searching, evaluating, and integrating. The test contains texts, figures, and tables. In addition to proper nouns, the word frequency was based on the 3500 words that are commonly used by elementary school students in Taiwan; the proportion of words that fall outside of these 3500 words was lower than 10%. The text types included web pages, search result lists, E-mails, and discussion boards, and the ICT skills needed by the four text types were all included in the curriculum specifications of the elementary school students in Taiwan. The text was rendered with either static or dynamic questions; the static questions rendered the web page in the form of an image, whereas the dynamic questions rendered an actual web page. The item response theory (IRT) reliability value of the test was 0.78, and the test was administered via a computer network. The test score was estimated based on the probability of the students' correctly answering each question using IRT, then converted into a domain score, with the highest score being 100 points.

2.2.3 ICT Skills Questionnaire

The online information search strategy inventory (OISSI) compiled by Tsai (2009) was adopted for the self-evaluation of the online information search capabilities of the students. A 6-point Likert scale was used in the questionnaire, which has a reliability coefficient of 0.85. Aspects of the OISSI focus on behavior, procedure, and metacognition with 25 questions. Two sub-aspects of control and disorientation were contained in the behavioral aspect, the procedural aspect included trial and error and problem-solving skills, and the 3 sub-aspects of purposeful thinking, target selection, and evaluation were contained in the metacognitive aspect.

2.3 Procedure

The test procedure in this study included an online group test and a paper group test. The online group test included an online reading test and the OISSI questionnaire, completed in 2 class periods in the school's computer classroom. In the first class period, the online reading comprehension test was conducted; at the beginning of the test, students were provided with account numbers to log in. Upon completion of login, the students were instructed on the purpose of the test and how to take the test. After ensuring that the students had no questions, the test began. The time for the test was 30 minutes, excluding the time for login and instruction. In the second class period, the online information search strategy questionnaire was administered, with the same login procedure and instruction as described above. A total testing time of questionnaire was 15 minutes. The paper and pencil group test was performed in the students' original classroom and administered sequentially according to the procedure developed for the Chinese reading comprehension test program. The investigator first explained to the students the purpose and method of the test according to the guidance on the test manual; then, the test paper and answer sheet were issued for students to begin. The total testing time was 60 minutes.

3. RESULTS

A path model was proposed to clarify the relationships between online reading abilities, paper reading abilities, and ICT skills. In the hypothesis model, paper-based reading skills have a direct impact on ICT and online reading abilities, and ICT skills also have a direct impact on online reading abilities. Grade had a direct impact on paper reading ability and ICT skills and an indirect impact on online reading ability. The predicted power level reflects similarities between sets of skills. If the view that ICT skills are very similar to online reading ability is supported, then ICT skills will have rather high explanatory power for online reading ability. If ICT skills only provide a low level of explanatory power that is lower than that of the traditional

reading ability and the 2 sets of skills are not able to provide a high joint explanatory power on online reading ability, then online reading ability is more consistent with the new literacy concept proposed by Leu et al., i.e., online reading ability includes the components of traditional reading skills and ICT skills but is different from the 2.

A structural equation model path analysis was conducted to test for fitness between the data and path model. The model and the standardized parameters describes in Figure 1. The results show that $X^2 (df = 1, N = 376) = 0.255, p = .613$ (AGIF=.997, CFI = 1.00, RMSEA= .000), indicating that the model fit the data well. The model shows that paper-based reading comprehension is the strongest predictor of online reading comprehension, whereas ICT skills play a significant but minor role. Paper reading comprehension also significantly predicts children’s ICT skills. Grade variables show a positive and direct association with paper reading scores and are indirectly related to online reading through paper-based reading comprehension. Nevertheless, grade variables are non-significant in terms of ICT skills. The models accounted for 45% of the variance. The results from the path analysis suggested that both paper reading and ICT skills accounted for variation of online reading. Furthermore, the effect of paper reading comprehension was more than ICT skills. Model, confirming the perspective that online reading comprehension include paper reading comprehension and ICT skills but different from both of them, was met. However, the grade variable failed to explain ICT skill levels.

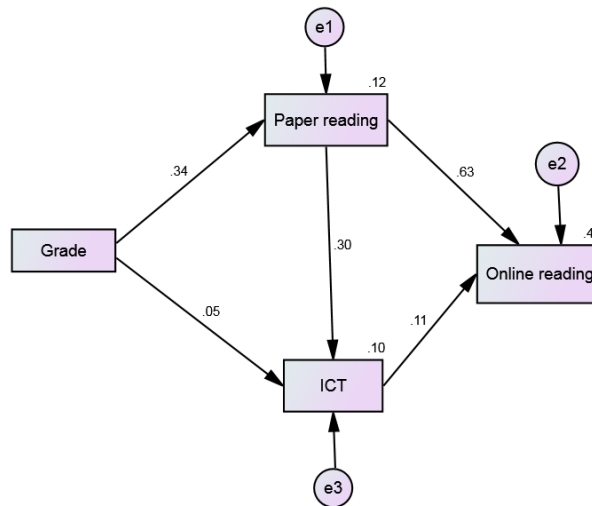


Figure 1. The path model showing relationships between paper reading comprehension, grades, ICT skills, and online reading comprehension

4. CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to clarify the relationships among traditional reading abilities, online reading ability and ICT skills. The results showed that online reading ability contains components of ICT skills and traditional reading skills, which explain almost half of the variance in online reading ability. The explanatory power of traditional reading abilities is significantly higher than that of ICT skills. Furthermore, ICT skills contain components of traditional reading skills. Consequently, the results supported the online reading mode as it has been redefined by international organizations such as PISA and ePIRLS, i.e., retaining part of the traditional definition and including ICT skills. Online reading skills have little similarity to ICT skills and are more like traditional reading skills. The new literacy concept proposed by Leu et al. is generally acceptable either, but the importance of ICT skills is not as high as they suggested. Traditional reading skills remain the main basis for online reading. In addition, ICT skills do include components of reading ability although in most of definitions of ICT literacy, reading is not mentioned.

Ultimately, the trend of online reading ability and ICT skills advancing with a student’s grade level is less pronounced than that associated with traditional reading abilities. Though access and usage of Internet at home or school is rapid growth, this result shows that convenient access is not sufficient to empower students

to be capable of online reading ability. It is important for teaching online reading and ICT skills in school so that students have the opportunity to become familiar with those skills.

In this study, we clarify the relationships among traditional reading ability, online reading ability and ICT skills, and the results show that, with the increasing proportion of online reading, traditional reading ability is still an important “literacy” in the digital age. The authors suggest that it is necessary to increase the class time spent on online reading after reader have a fair level of traditional reading ability. However, online reading ability still has approximately one-half of the variance that could not be explained by ICT skills and traditional reading skills. How to more precisely define the capability components that were not explained should be the topic of future investigations.

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