Examining the Effects of ABRACADABRA, a Web-Based Literacy Program for Primary School Students in Rural China

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TABLES

ACRONYMS

ABRACADABRA	A Balanced Reading Approach for Children Always Designed to Achieve Best Results for All
CLSP	Centre for the Study of Learning and Performance
DIBELS	Dynamic Indicators of Basic Early Literacy Skills
EFL	English as a Foreign Language
GRADE	Group Reading Assessment and Diagnostic Evaluation
ISF	Initial Sound Fluency
NWF	Nonsense Word Fluency
PSF	Phoneme Segmentation Fluency
RCT	randomized controlled trial

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ABSTRACT

This study investigated the effects of A Balanced Reading Approach for Children Always Designed to Achieve Best Results for All (ABRACADABRA [ABRA]), a web-based literacy program developed by the Centre for the Study of Learning and Performance (CSLP) at Concordia University, on primary school children in rural China. Approximately 360 third grade students from 10 schools (five experimental and five control schools) participated in a year-long matched control study. Treatment and control schools were matched on demographic variables and academic performance. Participants in both conditions were assessed before and after the intervention using a standardized reading instrument. After adjusting for initial pre-test difference, experimental students scored significantly higher on all three key reading outcomes: Phonological Awareness (ES = +.63), Phonemic Awareness (ES = +.59), Early Grade Literacy Skills (ES = +.38), Initial Sound Fluency (ES = +.43), Segmenting (ES = +.87), and Non-Word Reading (ES = +1.02). The study provided evidence that ABRA is not only effective in the context where English is used as a first or second language, such as Canada, Australia, or Hong Kong, but is also effective in a context where English is used as a foreign language (EFL).

Keywords: *ABRACADABRA, technology, EFL, rural China, early grade literacy*

INTRODUCTION AND RESEARCH PROBLEM

English has become an increasingly popular and important subject in many schools in China. In many major cities in China, students start to learn English from first grade and often spend years doing private tutoring in English after school. In contrast, students in rural areas do not start learning English until third grade or later. There is also a severe shortage of qualified teachers in these rural areas. Many English teachers are untrained and unqualified, leaving rural students far behind their counterparts in the cities. It is clear that English reading levels of Chinese students in rural China need to be dramatically raised. In addition, English teachers in rural areas need to be trained. ABRA is a research-proven web-based literacy program designed to help improve the reading literacy proficiency of children and train teachers to use evidence-based strategies for reading instruction.

OBJECTIVES

The purpose of this study was to examine the effectiveness of using the ABRA web-based literacy program on primary school students in rural Hunan, China. The two main objectives of the study were as follows:

1. To determine the impact of ABRA on the reading skills of non-native, English-speaking primary school students in rural China when compared to their counterparts who do not use ABRA
2. To determine the attitudes and experiences of teachers and students regarding this educational technology application

REVIEW OF LITERATURE

ABRA was developed by the Center for the Study of Learning and Performance (CLSP) at Concordia University. It is a free evidence-based software meant to facilitate learning and teaching literacy in schools.

Having been offered in several countries such as Canada and Australia, previous studies have found that ABRA is effective when English is used as a first language (Comaskey, Savage, & Abrami, 2009; Deault et al., 2009; Di Stasio, Savage, & Abrami, 2012; Piquette, Savage, & Abrami, 2014; Savage et al., 2010). Take for instance, a large-scale study done on 1,067 children from 76 kindergartens (Savage et al., 2013). Students who used ABRA significantly were found to outperform their control group counterpart (i.e., those who did not use ABRA) on skills such as phonological blending (p < .01) and letter-sound (p < .01).

Although these studies were done in countries where English is the primary language, ABRA was used by participants who spoke, read, and wrote in English as a foreign or second language. One such example is Australia, where multi-site, single-blind randomized control trials (RCTs) were conducted among indigenous students (Wolgemuth et al., 2013; Wolgemuth

et al., 2014). These studies indicated that ABRA was particularly beneficial to indigenous students who were at risk of reading difficulties.

Another example is a study in Kenya which found that low-achieving students who used ABRA experienced significant improvements in comprehension-related skills [t (1353) = 3.82, p < .00], such as passage comprehension [F (1353) = 12.26, p < .00], and listening comprehension [F (1353) =29.04, p < .00] (Abrami, Wade, Lysenko, Marsh, & Gioko, 2014).

Finally, a study in Hong Kong found that students who used ABRA scored significantly higher than the control group on phonological measures with an effect size of +0.33 (p < 0.04) (Cheung, Mac, Abrami, Wade, & Lysenko, 2016; Mak, Cheung, Guo, Abrami, &Wade, 2017). The administration of ABRA studies in Hong Kong further sets the foundation for the better use of ABRA in mainland China, where English is scarcely used in daily life and where students' general English proficiency is poor.

This has led to the study of the effects of ABRA in the remote city of Hunan, China, where English is rarely used in daily life.

METHODOLOGY

Pre-tests and Post-tests. All-experimental and control schools were assessed by testers hired, trained, and supervised by project staff on the Group Reading Assessment and Diagnostic Evaluation (GRADE), a developmentally based, group-administered assessment for pre-kindergarten to young adult students. At the end of the study, students in the experimental and the control schools were assessed on GRADE again.

Dynamic Indicators of Basic Early Literacy Skills, 6th Edition (DIBELS) (Good & Kaminski, 2002) was used as an individual test to supplement the group test of GRADE in the post-test. It included Initial Sound Fluency (ISD), Phoneme Segmentation Fluency (PSF), and Nonsense Word Fluency (NWF). Students were first instructed to differentiate the first sound from different words, and then asked to divide three- and four-phoneme words into individual phonemes, and lastly reading aloud non-word vocabulary.

Implementation Observations. Classroom observations in the ABRA schools were conducted by the research team as part of their routine implementation visits to the schools conducted three times each year. Using a standard implementation record

form, the research team noted the degree and quality of the implementation of each program element. In addition to the treatment classrooms, the research team paid a visit to all control classes to document how reading instruction was taking place in comparison to the treatment classes.

Student and Teacher Questionnaires. Both the student and teacher questionnaires were designed to address, by using a Likert-scale and open-ended questions, practices/reactions to: (a) ABRA-specific strategies; (b) professional development provided, with particular attention to the multimedia aspects; and (c) different lesson components of ABRA, including ease of use, perceived effectiveness for children, strengths, weaknesses, and recommendations for improvement.

Focus Group Interviews. Pre-designed interview guides were constructed for each stakeholder group, covering the same aspects covered by the survey questionnaire.

Table 1 shows the data collection timeline that was followed for conducting the tests and observations.

Table 1. Data Collection Timeline

Participants	Measures	When Administered
P3 Students	Group administered pre-tests (Group Reading Assessment and Diagnostic Evaluation) (GRADE)	October 2016
P3 Students	Individual and group administered post-tests (GRADE)	June 2017
Teachers	Questionnaire	June 2017
Class	Implementation observations	October to May 2015

KEY RESEARCH FINDINGS

The final analytical sample for students in the treatment and control schools was 219 and 131, respectively. As indicated in Table 2, the experimental group scored significantly higher than the control group at pre-test with an effect size of +0.28. At post-test using the composite pre-test scores as covariate, the treatment students scored significantly higher than the control students on all three reading outcome measures: Phonological Awareness (ES = +.63, p < .00), Phonemic Awareness (ES = +.59, p < .00), Early Grade Literacy Skills (ES = +.38, p < .00), Initial Sound Fluency (ES = +0.43, P,< .00), Segmenting (ES = +.87, P< .00) and Non-Word Reading (ES = +1.02, P< 0.00).

Table 2. Test Outcome

	Condition	N	Mean	SD	Adj. Means	p-value	ES
Composite pretest scores	ABRA	219	35.76	6.09		.26	+0.18
	Control	131	34.60	6.52		-	-
GRADE: phonological awareness	ABRA	219	17.16	3.52	17.00	.00	+0.63*
	Control	131	14.47	3.69	14.75		-
GRADE: phonemic awareness	ABRA	219	13.53	4.70	13.50	.00	+0.59*
	Control	131	11.10	2.39	11.15		-
GRADE: early literacy skills	ABRA	219	17.62	2.28	17.67	.00	+0.38*
	Control	131	16.84	2.52	16.76		-

	Condition	N	Mean	SD	Adj. Means	p-value	ES
GRADE Total	ABRA	219	47.27	9.90	47.04	.00	+0.60*
	Control	131	42.40	6.77	42.80		
DIBLES: initial sound fluency	ABRA	219	8.40	3.01	8.35	.00	+0.43*
	Control	131	7.00	2.77	7.09		-
DIBLES: segmenting	ABRA	219	41.15	16.65	40.80	.00	+0.87*
	Control	131	26.21	15.22	26.80		
DIBLES: non-word reading	ABRA	219	75.81	34.31	75.18	.00	+1.02*
	Control	131	41.01	28.30	42.07		-
DIBLES Total	ABRA	219	125.37	48.06	124.32	.00	+1.08*
	Control	131	74.21	38.52	75.97		

Teacher exit interviews. Six participating teachers were interviewed after the study. All of them agreed that ABRA could increase students' motivation for learning. They also thought that the monthly training was particularly beneficial for them to learn more about teaching phonics. Below are some of the comments from different teachers:

"ABRA helps me know more about phonics. Before this program, I have never thought about [sic] we can teach English in this way."

"Children love those ABRA activities. They are very interactive. Although sometimes the technical issue arise [sic], children will help each other to solve the problem."

"The training as well as the ABRA program provide me [sic] with lots of information related to phonics that I do not know. So, it is a fruitful experience to use ABRA to teach."

Student feedback. Ten students from each school were interviewed. Students were enthusiastic about using ABRA to learn English. Many students said they did not have a computer at home, and they enjoyed playing the ABRA games. Although some students expressed having the occasional technical problem with loading the ABRA games, they also said that peers and teachers would come and help them to solve the problem.

Photo Credit: Zhu Qing

CONCLUSION AND RECOMMENDATIONS

In contrast to previous studies in which educational intervention programs usually take three years to produce broad effects (Borman et al., 2007), this study demonstrated the effectiveness of ABRA in just one year. ABRA is particularly effective for Primary 3 Chinese ESL students in Hunan in terms of the development of phonological, phonemic and early literacy skills. In educational studies where effect sizes of around +0.20 are of importance to policy makers, the broad effects surpass those of previous educational technology reading programs (Cheung & Slavin, 2012).

This broad effect size may be explained by the intense training that the research team provided. Unlike previous studies in which teacher training was conducted two days once or twice during the academic year, the research team in this study conducted teacher training and class observations once a month. The frequent visits enabled the research team to better understand the questions and difficulties that teachers faced when conducting an ABRA class and, thus, training was more specific in addressing these problems and questions.

The research findings reaffirmed that teacher training is critical in the implementation process. The reality is that ABRA's success hinges on the professional development of teachers. In relation to this, a university-school partnership program is crucial for training teachers in the early stages of ABRA, so teachers can familiarize themselves with ABRA and maximize its potential. This is affirmed by teachers who expressed their appreciation to the University for providing the necessary guidance and support for them to carry out ABRA effectively. It is worth mentioning that, to ensure the effect was due to the use of ABRA instead of teacher training, teachers in control schools also received training in teaching and learning phonics without the introduction of ABRA, twice during the year.

RESEARCH LIMITATIONS

First of all, the study done in this report is quasi-experimental. Moving forward, a randomized controlled trial (RCT) should be done in order to give a more conclusive methodological value to the use of ABRA in regions where English is barely used.

In addition to this main limitation, during the course of the project, the server in Shaoshan broke down, so trace data for the academic year was lost. Nevertheless, the Centre for the Study of Learning and Performance (CSLP) at Concordia University was able to provide brief information, such as login and logout time, to ensure implementation fidelity for this project. With this experience, it is recommended that future studies pay more attention to IT support to minimize data loss.

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