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Evaluating Online and Offline Reading Software for Young Learners

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Abstract

Computer technology is increasingly becoming a prevalent tool for instruction in early childhood education settings and in homes with young children [1-2]. Determining which software provides a valuable and pedagogically sound learning experience can be a challenge. The present study applied a developmentally appropriate taxonomy for reading skill development [3] to evaluate commercially available software. The validity of 20 (online (N=3) and offline (N= 17) formats) software programs for promoting early literacy skills were examined. ***Overall, differences were found between the online and offline software formats.*** Across all formats it was clear that, although some skills are being trained in a developmentally appropriate manner, others are absent or have incomplete presentations in many programs. Recommendations on best practices for choosing emergent literacy software packages and for designing pedagogically appropriate software for young children are provided.

Keywords: reading Instruction, computer instruction, reading software.

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1. Introduction

Growing evidence that children's cognitive and social lives can benefit following use of effective software both in formal school learning environments and informal home and child-care contexts [4-5-6-7-8-9-10] has encouraged adoption of a diverse array of software as an instructional tool. Concomitant with the rise in the awareness of the importance of early instruction in emerging reading and literacy skills, there has been a particular increase in the development of software to support parents, educators and children in achieving the necessary literacy skills to promote learning [11-12]. The caveat to successful learning from technology, however, lies in the quality of the software developed and how the software is utilized. "Good" software provides a pedagogically sound learning experience that meets the needs of the learner and adapts to changes in the learners skills and abilities. How do parents, educators and other users know whether a particular software program is "good"? Until recently, there was no systematic way to distinguish literacy based software. Recently, however, [3] introduced a taxonomy that depicts skills necessary to become a skilled reader. The developmental sequence of reading skills contained in the taxonomy can be mapped onto the kinds of activities typically used in children's reading software. Through this taxonomy, software can be assessed for what is being taught as well as how well individual skills are being taught. The researchers [3] used the reading taxonomy to assess developmental appropriateness of the reading activities contained in software designed for children at different ages. The initial study also was restricted to offline, CD-based computer delivery programs. The present study extends this previous research by examining online reading software programs in comparison to these offline delivery systems. Given the limitations inherent in CD delivery systems, it was expected that well-designed online programs might provide even stronger instructional support for emerging readers.

2. Method

2.1 Selection of Software

In total, 23 commercially available software programs targeting skill development of Kindergarten and Grade 1 children were assessed. The three web-based programs were chosen based on their availability online (Abracadabra and Starfall are available for no charge online, while the Ooka Island has user fees charged on a monthly basis), popularity and use in public schools or in previous research, and development protocols which involved researchers and/or specialists in the field of education. The 20 offline programs were drawn from previous research by the authors [3] and were designed for children of kindergarten age (N=13) and Grade 1(N=7).

2.2 *Procedure*

Each game within each software program was played at each level and with both correct and incorrect responses to each action to permit the content and quality of instruction to be measured for each skill and subskill. The content and quality of instruction provided in each of the 23 software programs were evaluated using: 1) a taxonomy of reading skills developed by Grant and colleagues [3] and 2) a rubric for assessing to assess the quality of the instruction for each skill and sub-skill, and instructional scaffolding.

2.3 *Reading Taxonomy*

The reading taxonomy included 9 overall skills—Concepts of Print, Alphabetic Knowledge, Phonological Awareness, the Grapheme-Phoneme Relationship, Phonics, Syntactic Awareness, Decoding, Fluency and Text Comprehension and 45 supporting sub-skills [3]. All programs were coded for presence or absence of each skill and sub-skill in the taxonomy.

2.4 *Instructional Quality and Scaffolding*

Quality of instruction was scored using a 5-point Likert-type scale (1= inadequate quality, and 5= excellent quality). Quality reflected the amount of practice with each skill, and how often the skill was trained within the game. Instructional scaffolding was coded in terms of whether or not each skill had multiple levels of difficulty (0 or 1), and whether these levels of difficulty automatically advanced to the next level dependent upon the user's success (0 or 1).

3. Results

The 3 online software programs were compared to the 13 Kindergarten games and 7 Grade 1 games previously evaluated in research conducted by Grant and colleagues [3]. Descriptive comparisons are summarized in Tables 1 and 2.

3.1 Evaluating Reading Software for Overall Reading Skills and Instructional Quality

Among the three online programs, Starfall and Ooka Island provided training for 8 of the 9 overall reading skills, and Abracadabra trained each of the 9 skills (see Table 1). Quality ratings for skills presented ranged from 2 to 5 for the online games with an overall mean quality rating of 2.78, 4.22 and 2.56 for Starfall, Abracadabra and Ooka Island respectively.

Table 1. Summary of overall reading skills present in each of the three online games and nstructional quality rating score.

	Starfall		Abracadabra		Ooka	
	Skill Trained	Quality	Skill Trained	Quality	Skill Trained	Quality
Concepts of Print	1	2	1	3	1	3
Alphabetic Knowledge	1	4	1	4	1	4
Phonological Awareness	1	3	1	5	1	3
Grapheme-Phoneme Relationship	1	4	1	5	1	4
Phonics	1	3	1	5	1	2
Syntactic Awareness	1	2	1	3	0	N/A
Decoding	1	3	1	4	1	2
Fluency	1	4	1	4	1	3
Text Comprehension	0	N/A	1	5	1	2

When online software programs were compared to offline programs presented in earlier research [3] in all cases the online programs provided more of the overall reading skills than did the offline versions at both the Kindergarten or Grade 1 levels (see Table 2). Among the offline programs there was greater variability in what skills were included and those excluded with the greatest differences evident in the Grade 1 programs

Table 2. Percentage of online and offline software packages presenting each of the 9 overall reading skills and their corresponding quality ratings

	Online (N = 3)		Kindergarten (N = 13)		Grade 1 (N = 7)	
		Mean Quality		Mean Quality		Mean Quality
Concepts of Print	00	2.67	9.2	2.40	5.7	2.00
Alphabetic Knowledge	00	4.00	1.5	2.50	8.6	3.00
Phonological Awareness	00	3.67	6.9	2.40	5.7	2.83
Grapheme - Phoneme Relationship	00	4.33	1.5	2.50	4.3	3.00
Phonics	00	3.33	1.5	2.00	5.7	2.83
Syntactic Awareness	6.7	2.50	3.1	1.33	7.1	2.50
Decoding	00	3.00	3.8	1.86	5.7	2.00
Fluency	00	3.67	.70	3.00	4.3	2.00
Text Comprehension	6.7	3.50	5.4	4.00	1.4	2.80

Large differences were observed in the overall quality rating across the skills and across the formats. The Kindergarten games mean quality ratings tended to be lower, ranging from 1.86 to 4.00, followed by the Grade 1 offline software and the highest rating for online software (overall Ms= 2.04 , 2.55 and 3.41, respectively).

4. Discussion

Overall, as, expected, the online games provided a learning platform where more skills could be taught than was evident in most offline games. However, the quality of instruction in both online and offline games varied considerably as a function of the skill being introduced. In addition, some

individual offline games provided equivalent or higher instructional quality than some online games for particular subskills.

Among the online games, the skills trained with the highest quality included alphabetic knowledge, phonological awareness, and the grapheme phoneme relationship. Given the design of the games for children beginning their formal literacy training in school, this is indicative of the game designers focusing on training skills appropriate for the age of these children. Syntactic awareness had a low overall quality in all platforms and at all ages, which is similar to findings in previous research [3]. Thus, the games were showing a balanced approach to literacy by training a full taxonomic structure of reading development, while putting slightly more emphasis on essential emergent literacy skills such as phonological awareness and the grapheme-phoneme relationship.

Quality of instruction was higher among the online software programs in comparison to the Grade 1 and kindergarten offline programs, with kindergarten software programs reflecting the lowest quality of instruction rating. In general, few software packages received excellent or good ratings compared to the number receiving lower ratings. A score of 4 (good quality) indicated the presence of many different examples with the skill often taught by more than one activity/game and appropriate feedback was given for correct and incorrect answers however, there were typically few trials until mastery. The highest rating (5) indicated excellent quality and was similar to a rating of 4, with the additional qualification of having many examples until mastery and automatic movement across levels of the skill based on performance. It was expected that the online platform might afford greater opportunities to practice (with many more examples at each skill level and with many alternative ways of indicating success and prompting retrial for errors) and this seemed to be the case in the present data. The outcomes, however, indicate that quality of software instruction requires greater consideration by software developers and critical evaluation by adopters.

Overall, the delivery format of the game served an important advantage for inclusion of skills and quality of instructional delivery with online delivery offering more training. The quality of training provided, although slightly higher overall in the online context, still requires attention by software developers to improve instruction. Interestingly, examination of individual programs shows considerable variation. This variability indicates that different programs offer different strengths and weaknesses in terms of instructional content. In order to maximize learning gains from offline software, perhaps multiple packages need to be used to present a balanced and well-supported learning context. Among the online games, fewer additional supporting programs would be necessary. In summary, to use computer based instructional formats effectively, attention must be given to the goals of the instruction in order to select the appropriate instructional tool from the array of software available. Given the diversity of software programs available and the desire to incorporate computer based instruction within formal and informal learning contexts [13], children's reading software programs can provide one context for facilitating learning of software selection is judicious.

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