The Use of Mobile Phones to Support Children's Literacy Learning

Glenda Revelle, Emily Reardon, Makeda Mays Green, Jeanette Betancourt, and Jennifer Kotler

Sesame Workshop
One Lincoln Plaza
New York, NY 10023
(glenda.revelle@sesameworkshop.org)

Abstract. The goal of this study was to develop a mobile-phone based intervention that would encourage parents to engage their children in daily literacy-learning activities. The intervention content included text messages for parents, audio messages for parents and children, and Sesame Street letter videos for children. Messaging to parents suggested real-world activities that they could use to engage their children in learning letters. Pre- and post-interviews indicated a significant increase in the frequency with which parents reported engaging their children in literacy activities after participating in this study. In addition, 75% of lower-income participants and 50% of middle-income participants reported that they believed watching the Sesame Street letter videos helped their children learn letters. More than 75% of participants reported believing that a mobile phone used in this way can be an effective learning tool, since mobile-phone delivery made it extremely easy to incorporate literacy activities into their daily routines.

Keywords: Mobile, Phone, Education, Learning, Literacy, Parents, Children, Sesame Street, Video, Audio, Text.

1 Introduction

This paper reports the design and implementation of an intervention using Sesame Street content intended to encourage parents to engage their preschool children in literacy learning. Research has consistently shown that children who do not already have an adequate start in literacy development by the time they reach school rarely learn to read on schedule [1], and continue to have difficulty throughout elementary school, as almost 90 percent of children identified as poor readers at the end of first grade are still identified as poor readers at the end of fourth grade [2]. Thus, early intervention during the preschool years is critical for children who are at risk with regard to learning to read.

Research has also shown that children from lower income families are at significantly greater risk with regard to reading than children from middle or higher income families [3]. Neuman & Celano [4] compared access to print in low-income neighborhoods and

Y. de Kort et al. (Eds.): PERSUASIVE 2007, LNCS 4744, pp. 253–258, 2007.

middle-income neighborhoods. They found strong inequities between the two communities in the likelihood that children would find books, see signs, labels, logos and encounter spaces that were conducive to reading. Furthermore, in low income families parents speak less to their children and use less complex sentences when contrasted with more affluent families [5].

While there are inequities in access to print and other language rich environments, there are fewer income inequities in access to media. Media can be excellent resources for teaching literacy because they have an eager audience. Children spend more time engaged with media than with any other leisure or academic activity and are media "multi-taskers" spending time with "new" (i.e. computers, internet, handheld devices) media while simultaneously using "old" (television, audio) media platforms [6]. Low-income and minority children spend an even greater amount of time with media (specifically television) than their middle-class, non-minority counterparts [6,7].

Educational media & technology have been found to promote literacy learning in both formal (e.g. school) and informal (i.e. home) environments when effective teaching techniques (e.g. phonemic awareness, phonics, fluency, vocabulary, and text comprehension) are applied [8,9,10]. Sesame Street content in particular has been shown to increase children's literacy skills on a variety of measures including phonemic awareness, knowledge of the alphabet and reading conventions, and motivation to read and write [11,12,13,14].

The intervention reported here was designed to deliver Sesame Street educational materials focused on learning letters via mobile phone to parents and preschool children from lower and middle income families. This intervention applied the elements of Fogg's "functional triad" model [15] of persuasive technologies in the context of using mobile phones to encourage and persuade parents to engage their young children in activities that are known to lead to growth in literacy skills. The functional triad framework suggests that people view or respond to persuasive technologies in three ways: as a tool that increases capabilities, as a social actor that creates relationships, and as a medium that provides experience. As a tool, the portability of the mobile phones made it easy for parents to access the target content anywhere and any time throughout the day. Text messages and subsequent audio messages led participants through a process, and videos served as motivating factors that helped children to learn letters. As a social actor, provision of messages from Sesame Street's Maria and Elmo modeled a target attitude by expressing an excitement about literacy. Moreover, Maria's messages provided social support via suggestions of real-world activities for parents to engage in with their children, and both Maria's and Elmo's messages established relationships with the participants through consistent contact and social delivery of information. As a medium, the audio and video messages sent to participants not only delivered information, but also served as a motivator for engaging in target behaviors. Collectively, these functions suggest the tremendous potential of the functional triad for mobile applications designed for parents and children.

2 Participants

Participants in this study were eighty parents/caregivers and their three to four-year-old children who lived in Los Angeles, Oakland or Fresno, CA. Approximately half of of the families were living at or below the poverty line and half were living above the poverty line.

Participants were given a video-capable phone and service upgrade. They committed to engaging in literacy activities with their children 3-4 times per week for 8 weeks. All parents participated in a training session before the 8-week intervention began, which included a review of what they should expect during the study, on overview highlighting the role of the parent as a child's first and most important teacher, and a review of how to use the phone for the study.

3 The Intervention

The intervention consisted of text messages, audio messages for parents, audio messages for children, and video for children. Text messages were sent to participants' mobile phones on Mondays, Wednesdays, Fridays and Saturdays at 7 a.m. for the eight-week duration of the study, prompting parents to access audio messages and videos for one letter per day. Audio messages and letter videos were made available in alphabetical order, with four letters introduced in each of the first two weeks and three letters per week thereafter, so that participants would have access to all 26 letters of the alphabet within the eight-week duration of the study.

Each day that a text message was sent, the parent was first prompted to access an audio message from Sesame Street's Maria regarding the letter of the day, suggesting real-world literacy activities for parent and child to do together as they went about their daily routines. For example, Maria might suggest that while the parent and child were in the supermarket they look for fruits and vegetables that begin with the letter C, and that the parent point out the name of the item in text on signs in the store.

Next, the parent was prompted to click on an "Elmo link" for that day's letter and hand the phone to the child. Clicking on the Elmo link initiated an audio message for the child from Sesame Street's Elmo. Elmo talked to the child about the letter of the day and some words beginning with the letter, and then introduced a video clip from Sesame Street related to that letter (for example, the video "C is for Cookie" was shown when the letter of the day was C).

If participants accessed the system three to four times per week with their children (which almost all of them did), then by the end of the eight-week study period parents received 26 literacy activity suggestions from Maria, one for each letter of the alphabet, and children saw a Sesame Street video clip for each letter of the alphabet. In addition, after the Sesame Street video clips for each week were introduced they remained available in a "letter library" that was available for the remainder of the study period so that children could re-access them at any time.

4 Results and Discussion

Preliminary analysis of usage data, tracking exactly what time of day each access to parent messages and child videos occurred, indicates that both parent materials and child-directed materials were more likely to be accessed during the week than on week-ends. The biggest usage "spike" for both parents and children on weekdays was within the first hour after the text messages were sent (at 7 am local time for the participants), and usage continued to remain fairly high until 10 am. Usage then declined through the middle of the day, and rose again between 5 pm and 9 pm. Weekend usage in general was lower than weekday usage, with the morning spike in children's usage lasting a little later, from about 7 am until noon. In general, participants accessed materials that were released near the beginning of the eight-week study more frequently than those released toward the end of the study, and also (each week of the study) accessed materials released earlier in the week more than those released later in the week. Over the full course of the eight-weeks, parent literacy tips were accessed far less frequently than the Sesame Street videos were accessed.

Evaluative research on this project was conducted by WestEd, in collaboration with Sesame Workshop and PBS, and has been reported separately [16]. Highlights from that report include:

- Participants in both income groups were more likely to initiate real-world *letter recognition* activities with their children after participating in this study, and lower-income participants were more likely to initiate real-world *letter sound* activities as well.
- Almost all participants reported that their children found the mobile phone controls easy to use and could play or replay videos on their own without parental assistance
- 75% of lower-income parents and 50% of middle-income parents reported that the alphabet video clips helped their children learn letters.
- Interestingly, parents reported that their children's knowledge of the Alphabet Song increased during this study. Since the song was not included in the intervention content, parents attributed this change to their children's increased general letter knowledge.
- More than 75% of participants in both income groups believed *to a good extent* or *to a great extent* that a mobile phone used in this way can be an effective learning tool.

In summary, this study demonstrates that if multimedia literacy content is delivered to parents via mobile phone, they will access it and both parents and children will use it. By parents' report, using such materials influenced their own behaviors (prompting them to engage their children in more activities designed to increase their literacy skills) and influenced their children's awareness of and knowledge regarding letters. Parents in this study reported that they wanted to be involved in their children's early literacy development, and viewed the mobile delivery model as an effective way to support their efforts and their children's development.

These findings indicate that this mobile technology-based literacy intervention served as a highly effective use of persuasive technology. Participants reported

enormous enthusiasm about the accessibility of the mobile device and content, which enabled them to access the information while at home, in the car, waiting in line or in another location. Moreover, parents in this study indicated that the ready access provided by mobile delivery made it extremely easy for them to fit literacy activities into their normal daily routines with their children. The technology-based persuasive messages inspired participants to engage in behaviors that would lead to increased literacy skills in their children. Given the extremely busy lives of today's families, mobile delivery of educational media shows enormous promise for encouraging increased parental involvement in their children's learning.

Encompassing all of the elements of Fogg's functional triad, the success of this intervention demonstrates an application of technology that is functional, usable and persuasive. The mobile-phone based experience increased participants' capabilities, provided engaging and meaningful experiences, and created social relationships with the Sesame Street characters that enabled both enjoyment and learning. Parents who participated in this study noted that the most important aspect of Maria's literacy tips was the way in which they served as reminders to make their children's early literacy development a priority [16, p. 55]. Such reports speak to the value of the mobile phone as an effective learning tool as well as to the persuasiveness of content delivered via this technology. Although more work is needed to develop programs that will deliver such content to the low income families who need it most at a price they can afford, the current study serves as a starting point indicating much promise in the possibility of utilizing mobile phones to persuade parents of the benefits of engaging their young children in literacy activities and to motivate children to want to learn.

Acknowledgments. This work was funded by the U. S. Department of Education through the PBS Ready To Learn program. The opinions and interpretations expressed herein are the views of the authors and do not necessarily reflect the official position of the funding agencies. The authors would like to thank our colleagues at PBS, GoTV Networks, Orange You Glad, Sprint and WestEd for their collaboration as partners on this project.

References

1. Snow, C.E., Burns, M.S., Griffin, P. (eds.): Preventing reading difficulties in young children. National Academy Press, Washington, D.C (1998)
2. Francis, D., Shaywitz, S., Stuebing, K., Shaywitz, B., Fletcher, J.: Developmental lag versus deficit models of reading disability: A longitudinal, individual growth curves analysis. Journal of Educational Psychology 88, 3–17 (1996)
3. Institute of Education Sciences, National Center for Education Statistics, US Department of Education: National Assessment of Educational Progress (NAEP) (2005)
4. Neuman, S., Celano, D.D.: Access to print in low-income and middle-income communities. Reading Research Quarterly 36, 8–26 (2001)
5. Hart, B., Risley, T.: Meaningful differences in the everyday experience of young American children. Paul H. Brookes, Baltimore, MD (1995)
6. Kaiser Family Foundation: Generation M: Media in the lives of 8-18 year olds. Menlo Park, CA (2005)

7. Bickham, D., Vandewater, E., Huston, A., Lee, J., Caplovitz, A., Wright, J.: Predictors of Children's Media Use: An Examination of three ethnic groups. Media Psychology 5, 107–137 (2003)
8. Mitchell, M., Fox, B.: The effects of computer software for developing phonological awareness in low-progress readers. Reading Research and Instruction 40, 315–332 (2001)
9. Waxman, H., Lin, M., Michko, G.: A meta-analysis of the effectiveness of teaching and learning with technology on student outcomes. Northwest Central Regional Educational Laboratory (2003)
10. Linebarger, D., Kosanic, A., Greenwood, C., Doku, N.: Effects of viewing the television program "Between the Lions" on the emergent literacy skills of young children. Journal of Educational Psychology 96, 297–308 (2004)
11. Wright, J., Huston, A., Scantlin, R., Kotler, J.: The early window project: Sesame Street prepares children for school. In: Fisch, S., Truglio, R. (eds.) "G" is for "Growing"; Thirty years of research on Sesame Street, pp. 97–114. Lawrence Erlbaum Associates, Mahwah, NJ (2001)
12. Ball, S., Bogatz, G.: The first year of Sesame Street: An evaluation. Educational Testing Service, Princeton, NJ (1970)
13. Fisch, S.: Children's learning from educational television: Sesame Street and beyond. Lawrence Erlbaum Associates, Mahway, NJ (2004)
14. Rice, M., Huston, A., Truglio, R., Wright, J.: Words from Sesame Street: Learning vocabulary while viewing. Developmental Psychology 26, 421–428 (1990)
15. Fogg, B.J.: Persuasive Technology: Using Computers to Change What We Think and Do. Morgan Kauffman Publishers, San Francisco, CA (2003)
16. Horowitz, J., Sosenko, L., Hoffman, J., Ziobrowski, J., Tafoya, A., Haagenson, A., Hahn, S.: Evaluation of the PBS Ready to Learn Cell Phone Study: Learning Letters with Elmo. Final Report to the U. S. Department of Education (September 2006)