Open Source Books – Adapting a strategy for designing early reading materials

Purpose
The purpose of this presentation is to analyze data from a three year long design research project demonstrating how open source software design strategies foster new social arrangements and provide new tools to support the design, revision and broad distribution of early reading materials (Mackie, 2008). Working from the open educational resources (OER) framework (Geser, 2007; Iiyoshi & Kumar, 2008), this multi-domain project has three primary components: First, a brief analysis of the current literature and theory on the design of early reading materials and the practices and strategies of open source software design provides a common foundation. Next, analysis of case study data from a group of 5th grade students designing and testing books they created for their 1st grade reading partners demonstrates the practical components of the design and revision phases as well as provides insights into the benefits of local innovation and transformation of the typical roles of curriculum consumers and creators. Lastly, using data from a case study analysis of the books being used as part of a summer reading intervention for struggling 1st grade students in a low-income, high minority, urban elementary school, the results are analyzed to show the effects of design strategies to support local innovation and the benefits of increased access made possible by the low cost of the materials.

Perspectives/Theoretical frameworks
While the research is reasonably settled over the value of explicit phonics instruction for beginning readers (report of the National Reading Panel; NRP, 2000; report of the National Early Literacy Panel; NELP, 2008), the specific nature of the texts that best support phonics instruction and early literacy development is a significantly under researched topic (Hiebert, Mesmer & Cunningham, 2010; Allington, 2005). Adams (2009) gives an overview of the theory and strategies of designing decodable texts (books where a significant percentage of the words can be read using letter-sound relationships and sight words that have been previously taught in classroom instruction) and describes the critical role that accurate reading plays in developing automaticity. Hiebert & Mesmer (2006) highlights the importance of analyzing the text features of early reading materials and shows how different features cause disproportionate difficulty for low- and high-achieving students. Mesmer (2008) provides a thorough discussion of the issues and challenges for using and selecting early reading materials, providing what she calls, "tools for matching readers with texts." Cerveti, Jaynes & Hiebert (2009) describe the role of content-rich books designed to increase opportunities to acquire knowledge through reading, addressing what Neuman & Celano (2006) call the "knowledge gap." Each of these perspectives informs the design and revision of the books that are part of this project.

Iiyoshi & Kumar (2008) working from MIT (a leader in the OER movement) published a handbook gathering the most recent research and theory defining and describing the OER movement and analyzing the results of a wide range of OER projects. Mackie (2008) describes how the open source software design model represents a new set of social arrangements, transforming the way educational resources are designed and accessed. McMartin (2008) highlights the way in which the OER movement increases access and provides educational opportunities typically unavailable to a wide range of communities. Having worked personally as a computer programmer, website designer and computer educator over the last 25 years, I have significant experience with a wide variety of open source software applications and web-based public domain resources--many of which are built into the project website and used extensively in the design and distribution of our books.

Methods and data sources
The primary methodology of the project is design research which supports the iterative nature of writing books, testing them with students and making strategic revisions. The design research methodology also works well as a framework for analyzing the development of the project website, specific collaborations with public schools and special design projects. As for data sources, a brief literature review of the theory and practice of designing early reading materials and the practices and strategies of open source software design will give participants a common framework and language for discussing issues of design and strategies for revision. A case study methodology was employed to analyze data from a special design project where a group of 5th grade students designed, tested and gave out books they created for their 1st grade reading partners. Lastly, data is presented from a second case study of the books being used as part of an intervention to combat summer reading loss (Alexander, Entwisle & Olson, 2007) for struggling 1st grade students in a low-income, high minority, urban elementary school.

Results/conclusions
The most tangible result of this project is the set of books that has been created and made available on the website as an open educational resource. The books have been used in numerous kindergarten and 1st grade classrooms, tutoring centers and after school literacy programs. A set of the books was used last year and is being purchased again this year by a large, urban school district as part of their primary instructional materials for classroom teachers, for their after school literacy support programs and as a key component of their summer reading program. Results from the first case study of 5th grade authors foregrounds the practical components of the design and revision phases as well as provides insights into the benefits of both local design and transformation of the typical roles of curriculum consumers and creators. Results from using the books for the summer reading intervention demonstrate the ways in which the open source software model supports local innovation and how the open educational resources model facilitates increased access and broad distribution, increasing access to books by communities that are frequently under resourced.

The meta-level results and substantiated conclusions deriving from this project line up powerfully with the stated purposes of this conference. Our adaptation of the open source software design model fosters a new set of social arrangements and accesses new tools and new agents to support expansive curriculum design and integration. The open source model allows local communities to modify and personalize books to meet specific demographic, cultural or educational purposes, most powerfully, translation into any desired language. The web-based model of design and revision allow for a wide range of new agents (teacher education programs, high school writing classes, older elementary school students, etc.) to bring their expertise and specific skills to the design process, significantly transforming the traditional roles/identities of curriculum designers and consumers. The public domain aspect of the project creates access to high quality reading materials for cash-strapped school districts at a fraction of the cost of traditional materials. While a typical early reading book costs over $3.00, our books, when printed in bulk, cost under .40/each with production quality identical to typical commercial resources.

Scientific contribution
This project is of value to researchers in three primary ways. First, as a proof of concept of an alternative model of design for early reading materials, the set of books created demonstrate a working adaptation of the open source design model and the affordances offered. This model works exceptionally well when there are broad pools of expertise, clear models of best practices, significant benefit gained from transparency and responsiveness in the design/revision process and a need for high quality, low cost product -- a set of criteria that can generalize across a wide range of curricular topics and educational settings. Second, data from the project allow researchers to look at the impact of local design on

educational outcomes. It also offers a window into the impact of allowing students who typically are curriculum consumers to serve as curricular designers. Lastly, there is a noticeable scarcity of research on the specific effects of text on student literacy outcomes (Hiebert et al, 2010). One reason for this lack of research is the difficulty in designing and producing a set of experimental texts from scratch or the copyright issues involved with modifying existing commercial texts. By creating an easily modifiable public domain set of books, it provides researchers with a powerful vehicle for making theoretically based modifications to texts and studying the impact of those modifications.

The goal of this presentation is to describe a three year long design research project demonstrating how the open source software design model can be adapted to support the design and revision of early reading materials and to analyze results demonstrating successes and challenges to the projects' effectiveness. The growing prevalence and utility of web-based educational resources represents a critical technological frontier for researchers, teachers, students and curriculum designers. This presentation will support participants by demonstrating a working open educational resources model, by highlighting strategies for curricular design applicable across a wide variety of domains and by showcasing the benefits of local innovation in design and increased access made possible by the use of open source software design strategies and the OER model.

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