DEVELOPING LANGUAGE AND PRELITERACY SKILLS IN DEAF PRESCHOOLERS THROUGH SHARED READING ACTIVITIES WITH EBOOKS

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Abstract
Ebooks can help advance developing communication skills and (pre)literacy skills among deaf children, and more and more bilingual-bimodal ebooks are being produced with that goal in mind. Many of them aim to promote literacy through explicit pedagogical techniques, so adults have to learn proper ways to share the books with the children. An alternative is ebooks that aim only to offer stories that are fun to share. The rationale is that encouraging relaxed and playful interaction over stories naturally fosters language interaction and (pre)literacy skills without anxiety. Reading for pleasure is valuable for the smallest hearing children – we know that; it is among the most beloved family rituals. Reading for pleasure needs to be recognized as valuable for the smallest deaf children and needs to become a beloved family ritual for them, as well. We describe ebooks we produce and offer gratis on the Internet, analyzing one in detail, to show how it can advance a range of (pre)literacy skills. We hope that those raising and educating deaf children will adopt this more playful way of approaching shared reading with deaf children.

Keywords: deaf children, literacy, ebooks, shared reading activities

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Introduction

This paper focuses on pedagogical practice with regard to classrooms that have deaf students (where the rubric *deaf* subsumes anyone with reduced auditory access, including hard-of-hearing). We present lessons learned through applied work with undergraduate students in producing innovative ebooks, offered gratis on the Internet. The ebooks are intended to develop (pre)literacy skills, teaching children about characterization and narrative. This targeted development is predicated on promoting open-ended communication interaction with the adults who share the ebooks with them and through playful mimicry of the language models in the ebooks. Stronger communication skills can turn into stronger language skills, particularly if the (families of the) deaf children then learn to sign, and stronger language skills should lead to overall better skills at home and school.

We build on our preliminary work (XXXX 2016). Throughout we use the term *bilingual* to include knowledge of a sign language and of the written version of a spoken language, as commonly done in studies of literacy concerning deaf children.

First we discuss the value of pleasurable shared reading activities (SRAs). Then we turn to a description of our ebook production, and how that production aims at promoting pleasurable SRAs with these ebooks. Finally, via a close analysis of certain aspects of one of our ebooks, we demonstrate how our ebooks have the potential to promote some specific (pre)literacy skills. We conclude that our ebooks can offer a pleasurable home and school experience which could well encourage the kind of SRAs that promote (pre)literacy skills, offering suggestions of how the classroom instructor can use the ebooks in their lessons and asking them to encourage families to use them.

Importance of pleasurable, interactive Shared Reading Activities

Our ebooks are founded on the proposition that deaf children need to engage in shared reading activities (SRAs) that are enjoyable and that help develop communicative skills. Here we defend that proposition.

Deaf children are academically at risk (Easterbrooks et al. 2015). Scholars point to lack of a solid language foundation as the major culprit (Lederberg, Schick, and Spencer 2013), where deaf children with better language skills do better at reading (Mayberry, Del Giudice, and Lieberman 2011). Many deaf children are raised strictly orally; but the auditory information they receive (through hearing aids and cochlear implants) may not provide language access. A bilingual approach protects academic success since '… exposure to an accessible language is the key to developing native-like proficiency in any language, and a solid first language foundation is also critical for the successful acquisition of a second language' (Mounty, Pucci, and Harmon 2014, 334). Regardless of their speech skills, deaf children who feel confident in signing do better academically in reading (Chamberlain and Mayberry 2000; Goldin-Meadow and Mayberry 2002; Freel et al. 201; Scott and Hoffmeister 2017) and writing (Basha Ludago 2014), whether their parents are hearing or deaf (Hassanzadeh 2012), although socio-demographic factors play a secondary role in academic success (Scott 2015).

We therefore need efforts to aid communicative development of the smallest children, including preschoolers and early elementary-grade students. Importantly, activities for those children should be grounded in pleasure. Children learn through play (Kuschner 2008), gaining skills critical to reading (Gambrell 2011) and math (Myrayama et al. 2013). Play promotes health (Alexander, Frohlich, and Fusco 2014), ethical development (Edmiston 2007), and lifelong happiness (Martin 2014). Preschoolers explore the world through play, nourishing language and other cognitive faculties their plastic brains are primed to develop (Humphries et al. 2012). A study of deaf preschoolers suggests that engaging them in a game of storytelling is a powerful way to enhance their (pre)literacy skills (Aristizábal, Cano, Vesga, and Collazos 2017).

Deaf children's need for enjoyable (pre)literacy support leads directly to the need for appropriate SRAs. The 1985 National Academy of Education Commission on Reading concluded: 'The single most important activity for building the knowledge required for eventual success in reading is reading aloud to children' (Anderson et al. 1985, 23). That claim has garnered support over the years since. A 2014 policy statement of the American Academy of Pediatrics says reading to children from birth on is an essential part of their care (High and Klass 2014). That statement reviewed research showing that SRAs activate the parietal-temporal-occipital association cortex, which is largely responsible for multisensory integration. SRAs help the youngest children by nurturing the type of cross-modal associations crucial to vicariously entering a story – to experience and understand holistically (Whitehurst et al. 1988; Bus et al. 1995; Mol and Bus 2011); such early cognitive work marks the emergent print-literacy period (Mayer and Trezek 2015). A ritual of daily SRAs is the bedrock of certain cognitive skills, including reading.

Much research cited in the commission's report and in the AAP's policy report focuses on monolingual hearing children. However, these findings hold as well for multilingual children (Kalia 2007) and deaf children (Andrews and Zmijewski 1997; Williams 2004; Fung, Chow, and Mc-Bride-Chang 2005; DesJardin et al. 2014; Dirks and Wauters 2018). SRAs increase vocabulary (Mol et al. 2008, 2009), which is particularly important for the deaf child learning to read print, since this child does not pick up vocabulary in the print language by simply 'overhearing' it but can increase vocabulary through SRAs ((Trussell and Easterbrooks 2014; Trussell, Dunagan, Kane, and Cascioli 2017). SRAs teach narrative skills, particularly when adult-child interaction involves higher level facilitative language techniques rather than simply yes/no questions (Trivette, Dunst, and Gorman 2010, and see Long and Szabo 2016 on 'guided reading'). When adults ask open-ended questions about story comprehension – such as, 'What do you think the bunny will do next?' – and then give the child time to consider and formulate an answer, the child's preparatory skills for print-literacy grow (Whitehurst et al. 1998; Wasik and Bond 2001; Peters 2015), particularly the ability to engage in inferencing (van Kleeck 2008). Interestingly, the benefit in SRAs lies in enjoyment, not in pedagogical behavior (Zevenbergen and Whitehurst 2003). Children gain preliteracy skills by talking about the written text (hereafter referred to as 'text') with the adult; they do not need (and often do not enjoy nor pay attention to) the adult pointing at the print words as they say them. Important for us, SRAs can use both monolingual and bilingual books to enhance print-literacy (Semingson, Pole, and Tommerdahl 2015).

In conclusion, SRAs develop skills necessary for print-literacy through extensive playful language interaction (Deckner, Adamson, and Bakeman 2006) for both deaf and hearing children. The emotional and intellectual involvement in a story fostered by a pleasurable SRA makes the hard job of learning to read worth it (Willingham 2015, 182). And frequency of

pleasurable interactive SRAs is most critical for prekindergarten children, at home and at preschool (Zucker et al. 2013).

Unfortunately, hearing parents do not often engage in SRAs with their deaf children (Ewoldt 1986) and, if they do, it's typically not a pleasurable experience that they want to repeat (Schleper 1995) but a test that leaves both child and adult feeling defeated. Generally, hearing parents of deaf children tend to point to pictures and label them or ask the children to do that, leading to less responsive, less active behavior on the child's part than in truly effective SRAs (Aram et al. 2006; DesJardin et al. 2014). This needs to change. Our ebooks aim to offer a step in the direction of change.

Potential **of and need for such ebooks**

We here defend why we develop ebooks rather than traditional picture books, then we present evidence for the potential of ebooks to promote (pre)literacy skills, and finally we assess need for the type of ebooks we produce. Please note that we handle the issue of development of language skills in the next section, rather than here.

Gaining the attention of deaf children in an SRA requires gaining their visual attention and holding it. A hearing child cannot decide not to hear; even if her visual attention strays, she is still exposed to the book. But once the deaf child's visual attention strays, the connection to the story is broken. Traditional picture books, being static, have generally failed to capture and hold the visual attention of small deaf children. But, just as animated scenes in electronic stories capture the hearing child's attention (Bus et al. 2015), a story in a sign language immediately captures the deaf child's attention, whether or not they have experience with a sign language in their home, which most deaf children do not in the earliest years (Beal-Alvarez, Huston, and Beal-Alvarez 2014). We therefore decided to produce ebooks that had text plus sign videos, in order to appeal to both (deaf) children and the (hearing) adults that would share the ebooks with them. Our hope is that by making SRAs enjoyable for both, we will enhance the likelihood that SRAs will be repeated.

Ebooks do, in fact, appear to be useful pedagogical tools. The most recent research shows that SRAs with traditional picture books and SRAs with ebooks produce no significant differences in (pre)literacy skill development in hearing preschoolers (Silverman 2013; Homer et al. 2014; Willoughby, Evans, and Nowak 2015). Further, hearing first grade children's pleasure in ebooks corresponded to three motivational aspects of "intrinsic motivation": curiosity, choice, and challenge (Ciampa 2016), thus ebooks enhance children's motivation to learn to read (see also Picton 2014; Elahi, Mahmood, Shazadi, and Jamshed 2015). It may be that parent-child interaction with traditional books differs from parent-child interaction with ebooks, but not enough work has focused on this question to reasonably speculate whether such a difference might have consequences for the child's development of (pre)literacy skills (Krcmar and Cingel 2014). Still, it looks like ebooks that are designed to tell a story lead to very young children's comprehension of the material that is equal to or even superior to that from traditional picture books, in contrast to ebooks that are enhanced (such as with games), which can be distracting and might lead to cognitive overload (Shamir et al 2012; Bus et al. 2015; Takacs, Swart, and Bus 2015; Reich, Yau, and Warschauer 2016).

In fact, Takacs, Swart, and Bus (2014) found that ebooks with an oral narration can facilitate story comprehension without interaction from adults by using animation (such as showing how little crocodiles work their way out of the eggs) and music (such as sad music to convey someone is 'heartbroken'). They conclude that with such digital enrichments ebooks can

be as effective as an adult as a scaffold in a child's comprehension of a story and in a child's vocabulary development. We note that other studies conclude, to the contrary, that adult interaction in reading ebooks intensifies the (pre)literacy benefits (Segal-Drori et al. 2010; Korat et al. 2014). Further, we note that the children in Takacs and colleague's study were reading ebooks in their native language. This is not the situation of many children, including deaf children.

Ebooks turn out to be of particular pleasure to children learning to read in a language that is not their native language (Ghazal Ghalebandi and Noor Hidawati 2017), a situation common to deaf children. Here interaction with an adult is important: a study of immigrant children learning to read in a language that is not their home language found that sharing an ebook with a teacher was far more effective in promoting vocabulary development than using it alone (Segers at al. 2004). Studies of deaf children also conclude that ebooks have similar benefits to traditional picture books (Wauters and Dirks 2017) and that the shared aspect is of great importance (Dirks and Wauters 2018).

There are, in fact, a number of ebooks for deaf children that include signing. Many initiatives in early intervention promote pedagogical SRAs for deaf children using ebooks, with guidelines for parents, telling them to point to text words and fingerspell them (Dirks and Wauters 2015). Sometimes these initiatives give a simple linguistic analysis of the texts (such as the NSF Science of Learning Center on Visual Language and Visual Learning (VL2) at Gallaudet University, which produces ebooks; Napoli and Mirus 2015). Many times pedagogical SRAs focus on 'dialogic reading': the parent asks a question, prompts the child's response, evaluates it, expands on it, then guides the child to repeat it (Fung, Chow, and McBride-Chang 2005).

SRAs guided in this way are lessons rather than playful interaction – recommended for older children. Some ebooks are designed to work with such guidelines (Malzkuhn and Herzig 2013), but many are not, so parents may have difficulty following the guidelines. That difficulty can lead to the parent worrying about their own competence in guiding their child toward print-literacy. The child senses that the SRA is a test and may want to please the parent but, without understanding the story, may have little idea of how to do that. So the child is, likewise, on edge. Both may leave the SRA defeated and relieved that it ended. In other words, using ebooks intended for the older child with the younger one might give a result contrary to that hoped for.

The evaluation of what is appropriate for older versus younger children in developing (pre)literacy skills is based not just on playfulness, but on methodology. There is a well-accepted distinction in discussions of acquiring literacy between 'outside-in' and 'inside-out' information (Whitehurst and Lonigan 1998). Outside-in information includes matters associated with comprehension, but not necessarily tied to text, such as language development, story structure, and conceptual knowledge. Focusing on outside-in information is appropriate with children of all ages. Inside-out information includes matters closely tied to text, such as phonological and letter knowledge. Focusing on inside-out information is appropriate with older children. Outside-in skills are 'a critical step in learning to read for meaning' (Whitehurst and Lonigan 2001, 14) and they feed inside-out skills.

The younger deaf child, then, needs playful ebooks for SRAs that will promote, or at least have a chance of promoting, interactive communication of the outside-in information type. That is the sort of ebook we produce.

Our ebooks, parent-childcommunicative interaction, language development

To develop good literacy skills, scholars agree that children must have a solid foundation in a first language (Beck and Nebors 2001) with extensive vocabulary and skills in syntax and discourse (Dickinson, McCabe, and Essex 2006). This foundation allows the child complex interactions with capable users of the language (Mayer and Wells 1996). It also allows the child use of language to communicate with oneself, transforming thought into language (Watson 2001). One of the strongest arguments for SRAs, as we have seen, is that the interaction with adults provides support for first language acquisition, vocabulary growth, and development of a complex syntax (Whitehurst et al. 1988).

The question, then, is how SRAs with bimodal-bilingual ebooks like ours can help develop (pre)literacy skills in deaf children if the parent and child are not already signers. Our answer is that by introducing good signing models into the home via our ebooks, we will entice both parent and child to get interested in a sign language, which, in the cognitively richest scenario, can then lead to the whole family learning to sign and getting involved in the deaf community. In the least optimistic scenario, the family will simply watch and enjoy – which is not a bad result. Fortunately, the cognitively richest scenario is a real possibility.

All children need to acquire language. Some deaf children acquire a spoken language via an assistive aid, such as a cochlear implant, but there is little predictability as to which children will succeed (see Yoshinaga-Itano, Baca, and Sedey 2010 for one of the most optimistic assessments). In contrast a sign language is accessible for all deaf children (Humphries et al. 2012) and many now recommend that all deaf children learn a sign language, with the idea that if they happen to also acquire a spoken language, they will have the added benefit of being bimodal-bilingual, but in no case will they be linguistically deprived (Napoli et al. 2015; Hall 2017). Further, deaf children who sign achieve better academically, including at reading (Clark et al. 2016). Likewise, the family of a deaf child is well-advised to learn a sign language, because language communication is an integral part of family health and happiness and of the deaf person's health and happiness (Luckner and Velaski 2004; Kushalnagar et al. 2011). All of this leads us to conclude that our ebooks have a better chance of promoting effective SRAs if they also promote sign language use. We believe they do that, as we now argue.

The ebooks we produce have text and illustrations, like ordinary picture books, plus videos in a sign language, where the signer is deaf and the sign language used is that signer's preferred language of communication. Families with deaf children spend more time in SRAs when they have ebooks with a signing narrator, which is important, since longer exposure positively impacts language and print-literacy development (Mueller and Hurtig 2010).

Our ebooks, then, plant a good sign language model in the home, and one that the family is likely to spend extended time with. Rich language exchanges between deaf children and their mothers in the child's preferred mode of communication, in particular, are critical to the academic success of deaf children (Calderon 2000). The videos in these new ebooks have a chance of encouraging such exchanges; they aid in general language learning through integration of visual and linguistic information (Tanenhaus et al. 1995), contextual cues (Chalhoub-Deville 2003), and reliance on world knowledge (Chambers et al. 2002). Hearing family members can consult the text for clarification as they play with learning to sign the story. Thus our ebooks promote metalinguistic knowledge of language in general and of sign languages in particular, since the child and family can explore and develop knowledge of a particular sign language (a facet common to sign literature; Bascom 1954).

While deaf preschoolers have been shown to learn some rudimentary ASL from virtually interacting with a screen character (Huang et al. 2008) and while they show improved literacy-

related engagement behaviors after watching educational sign videos (Golos 2010), none of this means that the child can acquire a first language from these ebooks alone. No research on first language acquisition that we know of makes such a claim. All evidence from research on first language acquisition points toward the critical role of social interaction regardless of language modality (Tomasello 1992; Clark 2009; Kuhl 2010; Meisel 2011; Hoffmeister and Caldwell-Harris 2014). So if the deaf child is to learn to sign, she will need much more exposure to a sign language than ebooks alone can provide.

In contrast, those family members who already have a first language can learn much about a sign language from these videos, just as other people with a firm first language foundation can learn much about a second language from digital supports (Kukulska-Hulme and Sheild 2008; Saville-Troike and Barto 2016; Schulze 2017). But even in the instance of learning a second language, many argue that human interaction is of critical importance (Gibbons 2003; Gass 2013).

Our point is not that the child, nor even the hearing family members, will become competent in a sign language from watching such ebooks. Rather, the child and the hearing family members will see a good sign language model and will recognize implicitly that sign languages are real languages (since the signing and the text are delivering comparable information), overcoming any overt or latent prejudice against signing (Humphries et al. 2017). This may lead the family to playful gestural and language interaction (perhaps mimicking the videos), and to learning some signs. Learning a few signs might whet their appetite for more. This is not just a pipe dream; many hearing parents hope to learn to sign precisely through SRAs with their deaf children (Weaver and Starner 2011). The family that uses bimodal-bilingual ebooks, then, is more likely to make contact with the local deaf community and commit themselves to learning a sign language through classes and through interaction with deaf people, which is a first goal in establishing a language foundation for the child (Kushalnagar et al. 2010).

The language support our ebooks supply is similar in some ways to that in multimedia stories for multilingual hearing children, such as the books used across Europe created with Fabula software (Edwards, Monaghan, and Knight 2000). Fabula ebooks aim to support, among others, the child who uses a minority language at home that differs from the school language (such as Welsh-English, or Basque-Spanish). These ebooks have texts in both home and school languages. Children can click on a speaker button to hear the text read in either language. There are several advantages. First, the child who speaks a minority language finds support in scaffolding from reading skills (especially comprehension) in the home language to the school language. Second, the parent who speaks the minority language but cannot read the school language is enabled to enter SRAs with the child. Further, those ebooks can help adults improve their own use of the school language. Third, the child who speaks the majority language and is often monolingual becomes more aware of language issues in general. In America ebooks using audio and video have been found to provide similar advantages (Skouge, Rao, and Boisvert 2007). In a study of bilingual-bimodal ebooks with a signing narrator where hearing parents were trained on how to use the ebooks with their deaf children, even parents who did not undergo the parent training and were noncompliant about following the recommendations that came with the ebooks turned out to learn signs purely from watching the sign narrator (Mueller and Hurtig 2010).

The ability to review the videos offers a final advantage: it promotes an analytical approach to language and story (Krentz 2006). Given all this, the interaction of adult and child in

SRAs should help in initial stages of learning some signs and in understanding of characterization and narrative, and, further, it might establish a love of literature.

Sources for the ebooks

The new ebook project has no external funding; books used as a basis must be in the public domain or the copyright holders must grant their kind permission. Deaf children (and their parents) deserve as high quality reading materials as the best materials for hearing children. We hope to guarantee quality by using published books or books offered on the Internet that our students (as described in the next section) unanimously agree upon.

Some of these ebooks present traditional tales, giving deaf children stories they have a right and need to know as people living in their country, whatever that country might be. Children living in America, for example, might stumble across a reference to Humpty Dumpty or Santa Clause. Being completely uninformed about something (nearly) all the hearing children are informed about puts the deaf child at risk of both appearing and feeling unintelligent and isolated. The same can be said of children in any country with respect to information traditionally known by hearing children, regardless of their family culture. While the hearing child picks up information simply by overhearing it, via so-called incidental learning, the deaf child needs to be specifically informed, particularly about matters outside the family experience (Powers, Gregory, and Thoutenhoofd 1998; and see Trussell and Easterbrooks 2014).

All stories must easily capture the visual attention of the child, which means that they should be full of actions or images that our signers can readily bring to life. All must be relatable to deaf children's life experiences to provide a welcome into reading (Dennis, Lynch, and Stockall 2012). The narratives center on ordinary events like birthday parties, as well as extraordinary but easily relatable events like a runaway baby carriage. In some a non-human character presents the story from a minority viewpoint, allowing deaf children to identify. In one a dog moves to a house full of cats; in another an egg decides to get hard-boiled and bounces away rather than allowing himself to get cracked; in another a character faces huge challenges, but with self-confidence and hard work, those challenges are met. Some introduce classics. Four are nonfiction. Some target toddlers; others, preschoolers or early elementary.

Making and producing the ebooks

The authors of this article are linguists. One used to act in the National Theater of the Deaf, being a deaf native signer of ASL. The other writes children's books. Our areas of expertise are synergistic; they led us to try to contribute toward the (pre)literacy development of deaf children by providing materials for SRAs. We teach at different institutions, a hundred miles apart, offering a joint course in which students from the two campuses collaborate to produce these bilingual-bimodal ebooks. Our interaction is often via the Internet (video chats), as well as several visits of one group to the other group's campus.

The professors are sounding boards and guides throughout acting, filming, and producing. All students study sign literature and educational research on literacy among deaf and hearing children, and they consult on every aspect of the ebooks. We form pairs (one student from each campus) for each ebook; then teams made of two pairs consult regularly. We test early drafts of our ebooks at deaf schools local to our institutions and use children's and teachers' feedback in improving later drafts. We are attentive to providing opportunities likely to

elicit the strategies for interactive behavior between adult and deaf child described in Dirks and Wauters (2015).

Our ebooks use storytelling techniques of sign literature: the visual vernacular (extensively outlined in Bauman 2006). In this way, our ebooks develop not just (pre)literacy skills in print-literacy, but also sign-literacy skills, offering deaf children skills rightfully theirs as part of their deaf heritage (Sacks 2009; Holcomb 2010) and a way not simply to express themselves, but to be eloquent in doing so. That is, sign literature helps the deaf child not just increase world knowledge but create identity (Sutton-Spence and Kaneko 2016). Further, a recent study of deaf children who were targeted as being at risk with respect to developing literacy skills and who were given SRAs as intervention concluded that a deaf story-signer leading those interactions was effective in helping them understand the readings (Andrews, Liu, Liu, Gentry, and Smith 2017). This suggests that the visual vernacular is particularly suited to helping deaf children understand narrative.

The techniques of the visual vernacular often have spoken counterparts in the form of voice alterations (Greene Brabham and Lynch-Brown 2002). So when reading aloud, the reader can change voice pitch, geographical accent, nasality … to sound like different characters. Visual-vernacular techniques can give the deaf child analogous advantages (Napoli and Mirus 2015): beside varying manual motion speed to indicate narrative changes (such as fast action), signers can role shift, whereby the signer embodies one character, then shifts (torso, head, or gaze) to embody another character. This helps the reader understand characterization and develop Theory of Mind (Schick et al. 2007). Additionally, signers can vary shot distance, for example, showing a horse up close by letting the fists become the hooves, or at middle-range by letting the nondominant hand become the horse while the dominant hand is a rider on the horse, or at a distance by having the two index fingers brush past each other like horses in a race seen from the stands – all of which help readers interpret plot.

Sign languages have their own grammars, distinct from the grammars of their ambient spoken languages. Accordingly, we encourage our signers to read the story, then tell it naturally in their sign language, without attempting to translate the text. This is a crucial point. Strict adherence to a text, even while applying techniques of the visual vernacular, can result in grammatical but atypical signing that doesn't enhance comprehension. Signing deaf parents seem to instinctively know this; they do not feel constrained by text in SRAs with their deaf children (Swanwick and Watson 2005). The signers in our ebooks likewise are not constrained; they use accessible, uncontrived language, organizing the information in a way natural to sign narrative. Thus, for example, our signers present scenes by giving the background image (the room or the tree or wherever the action is to take place) before creating moving characters, as is typical of sign literature (Sutton-Spence and Kaneko 2016, 168).

Our signers practice to each other and to deaf people outside class. The final versions of our ebooks tend to integrate information from text and illustrations into the signing. While the hearing child who someone reads the text to might not get any mention of a mouse under the table in the illustration, the deaf child might well see signing that lingers on that mouse's pointy ears or flickering whiskers. In general the signers in our ebooks make reference to details in the illustrations via the use of eye gaze or other pointing, an effective engagement strategy (Allen et al. 2014). In fact, in our ebooks even new information, not present in the text nor illustrations, might creep into the signing (as we see in our next section). This freedom respects the signers' creativity and our reader benefits: this creative freedom has led to excellent language modeling and more fun. The relative autonomy of the signers allows them to enjoy developing their own

methods, making each ebook unique. This is a welcome result since complex differences in learning behaviors indicate that children should be offered reading materials employing varying strategies in helping understand stories (Moore and Wade 1998).

As of this writing (summer 2018), twelve of our ebooks are in ASL with English text. Seventeen others match the appropriate national sign language with text in the ambient spoken language – including the sign languages of Brazil, Fiji, Grenada, Ireland, Italy, Japan, Korea, Nepal, Iran, and Saudi Arabia. We also include on our website three ebooks with the sign language of Germany, produced by students at the University of Hamburg with our support, and one ebook with the sign language of Sweden, produced by students at the University of Stockholm with our support. Finally, we make youtube versions for use in classrooms and on more platforms, plus we are developing an app that will allow us to make ebooks for any platform (since iBooksAuthor, the only available free app presently, can be used only on Mac platforms).

Analysis of one of our ebooks

We here exemplify how the new ebooks can help develop (pre)literacy skills in deaf children by analyzing one, best known by its opening words 'Twas the night before Christmas'. A youtube version of it is available, and our discussion below refers to the timing bar on that version (Beckman et al. 2014). We worked from the original picture book (Moore 1862). This ebook is representative of our ebooks for the older preschooler; we have chosen it for discussion since it is adaptable to SRAs with children as young as toddlers up through elementary school. It is classic, so we assume familiarity, and do not reproduce the entire text. The signer, Joshua Beckman, has given us permission to discuss every aspect of his work.

Overall organization of text and of sign rendering

The original text consists of 28 rhyming couplets, organized across five pages. Our signer produced 37 video clips altogether, where most clips correspond to a page of text, but several times two clips correspond to a single page. We here compare how narrative is handled in the couplets verses this ebook.

The spoken rhyme is tyrannical with respect to organization of narrative. Consider:

He had a broad face and a little round belly,
that shook when he laughed, like a bowl full of jelly.
He was chubby and plump, a right jolly old elf,
and I laughed when I saw him, in spite of myself.

The first three lines focus on the appearance of Santa; the fourth shifts focus to the narrator's reaction to Santa. However, the rhyme forces couplets; there is no oral opportunity to group the first three lines together in contrast to the fourth. The original book designer laid out these two couplets with the first on the bottom of one page (which consists of three couplets, an illustration, then three more couplets) and the second on the top of the next page (preceded by an illustration and followed by five other couplets).

Our signer, instead, visually marks narrative focus-shift. He grouped these lines as outlined below, where numbers indicate the minute and second when clips begin and end in the youtube video.

4:08-4:12 *He had a broad face and a little round belly,*

4:13-4:18 *that shook when he laughed, like a bowl full of jelly.*
He was chubby and plump, a right jolly old elf,
4:19-4:26 *and I laughed when I saw him, in spite of myself.*

The focus shift from Santa to the narrator coincides with a clip change (from the second to the third), enhancing the child's understanding of that focus shift. Likewise, there are three pages, with each clip belonging to a different page of text. This visual arrangement allows the first two pages/clips to focus on the appearance of Santa, while the third shifts focus to the narrator's reaction. The visuals aid following the narrative focus.

In the text, rhyme also overrides narrative action-shifts. Here are two couplets appearing on the same page:

A wink of his eye and a twist of his head
soon gave me to know I had nothing to dread.
He spoke not a word, but went straight to his work,
and filled all the stockings, then turned with a jerk.

The action shifts from Santa's behavior toward the narrator to the job Santa came to do. This shift takes place in the middle of the third line. The arrangement of the couplet in no way contributes to the child's comprehension of the action shift.

Our signer, instead, presents two pages of text with a clip for each:

4:27-4:32 *A wink of his eye and a twist of his head*
soon gave me to know I had nothing to dread.
He spoke not a word…
4:33-4:44 *…but went straight to his work,*
and filled all the stockings, then turned with a jerk.

Clip organization reinforces action shift, aiding narrative comprehension.

Such reorganizations of narrative materials are typical of the arrangements of text to signing in our ebooks. The deaf child can be baffled by an organization based on sound (rhyme) they do not access. Packaging that narrative in an organization based on visual information lends the story visual sense.

There is one more important difference between our ebook and the text in the original book. The original book includes the couplet:

As dry leaves that before the wild hurricane fly,
when they meet with an obstacle, mount to the sky.

This line doesn't advance narrative, plus the syntax is convoluted to facilitate rhyme. Our ebook omits that couplet. No one has yet written to us complaining; it was skip-able.

In sum, our signer's clip organization and the matching text reorganization give consistent support to narrative understanding.

The three R's as aids to literacy

Rhyme, rhythm, and repetition can lead to predictability, which helps the child anticipate plot, aiding in narrative comprehension (Bialostok 1992). We now discuss these tropes in this ebook, as an example of how they are used in our ebooks in general.

Rhyme. Spoken rhyme can help children memorize story and associate words to print (Geller 1983). The ability of spoken rhyme to do this depends on auditory access. Our signers employ rhyme as well – sign rhyme. A sign consists of the parameters handshape, movement, and location (Kaneko 2011; simplifying from Stokoe 1960). If only one of these three parameters differs between two signs, they strongly rhyme; if two differ, they weakly rhyme (Valli 1993).

This ebook opens with three sign rhymes. First we give the opening couplet in English, which is arranged in two video clips – each on a separate page. Under the English text appears the ASL transcription:

0:09-0:19	*Twas the night before Christmas, when all through the house*
	I LOOK-BACK NIGHT BEFORE CHRISTMAS HOUSE ALL-AROUND QUIET[1]
0:20-0:28	*Not a creature was stirring, not even a mouse.*
	LOOK-FOR EMPTY-EVERYWHERE MOUSE LOOK-FOR NOTHING

The signs ALL-AROUND (0:16) and EMPTY-EVERYWHERE (0.23-0.24) differ only by handshape. The signs HOUSE (0:15) and QUIET (0:17-0:18) differ only by movement and the fact that QUIET changes palm orientation. The signs MOUSE (0:25) and LOOK-FOR (0:21, repeated in 0:26) differ by location and movement, as well as by the fact that MOUSE is one-handed, while the signer uses both hands for LOOK-FOR.

As a tool for memorization, this description of the rhyme, however, does not do it justice. The dictionary forms for the signs HOUSE and QUIET use a B-handshape, while the dictionary form for ALL-AROUND would use the 5-handshape. But in this clip the signer uses a relaxed B-handshape, so the fingers, instead of pressing against one another, are slightly spread. Likewise, he uses a relaxed 5-handshape, so the fingers, instead of being strongly spread, are, again, slightly spread. The result is that the child (and parent) who mimics the signing can move fluidly from HOUSE to ALL-AROUND to QUIET, using the same handshape. The signer (and child, and parent) transforms one sign into the next into the next. Transformation is typical of sign poetry (Bauman 2006) and might aid in memorization as much as rhyme does.

Rhythm. The metrical line of the text is doggedly anapestic tetrameter. Even without regular metrics, however, hearing readers tend to fall into a meter (Guaïtella 1999). Something about the reading aloud process itself leads us to a rhythmic organization. The perception of rhythm may be critical to gaining literacy (Huss et al. 2011). If that's true, then if sign stories are to give the deaf child whatever advantage rhythm gives the hearing child in an SRA, they also must establish a rhythm. Rhythm in sign languages can be established by varying the size and dynamics of movement (Valli 1993). Rhythm in sign literature helps capture the attention of younger deaf children (Blondel and Miller 2000, 2001).

Rhythm in spoken language poetry can also signal closure (Smith 1968). Sign languages likewise have rhythmic ways to show closure, including 'resting or holding a sign after performing several in quick succession', as well as 'pulsing' (body beats while holding or repeating a sign: Maler 2013, sections 3.9-3.10).

All signers in the new ebooks establish rhythms; the signer in this particular ebook is exemplary. Fingerspelling, for one, has a strong beat. Consider the sign rendering of these lines (the clip from 2:15 to 2:33):

And he whistled and shouted and called them by name.

[1] We adopt the usual convention of using small capitals to indicate signs.

Now, Dasher! Now, Dancer! Now, Prancer and Vixen!
On Comet! On, Cupid! On, Donner and Blitzen!

As the signer moves into the list of names, he points to one side and fingerspells a name. Then he shifts his torso to the other side, points, and fingerspells another name. The strong beat and body shifts emphasize parallelism between phrasing and meaning.

Before the signer began that name list (from 2:11 to 2:14), he was holding the reins of the sleigh, moving his hands up and down as though controlling reindeers. At the end of the name list, he returns to that action with the original rhythm. Thus we have the name rhythm nested inside the rein-controlling rhythm, helping the child see the continuity of action before and after the name list.

Rhythmic phrases end in holds (pauses). Let's look again at the first two clips, where we have now marked the holds:

I LOOK-BACK NIGHT BEFORE CHRISTMAS [hold$_1$] HOUSE ALL-AROUND QUIET [hold$_2$]
LOOK-FOR EMPTY-EVERYWHERE [hold$_3$] MOUSE LOOK-FOR NOTHING [hold$_4$]

The holds make it clear that in these clips each sign line is comprised of two equal parts – hemistichs. The end of each hemistich is indicated by a nonmanual marker (an articulation of eyes, eyebrows, head…). For hold$_1$ (0:14) and hold$_2$ (0:18) that marker is a head nod; for hold$_3$ (0:25), eye aperture: the eyes go from squint to fully open, then blink; for hold$_4$ (0:28), a blink. Holds mark rhythmic closures throughout the story and coincide with semantic groupings.

If, instead, there is a semantic grouping that continues from one clip to the next, the signer makes continuity obvious via articulatory transitions. One transition-method repeats the sign from the end of one clip at the beginning of the next. The clip corresponding to the text *had just settled our brains for a long winter's nap* (1:23-1:30) ends with the sign FALL-ASLEEP (1:30). The next clip (1:31-1.38) corresponds to two couplets:

When out on the roof there arose such a clatter,
I sprang from my bed to see what was the matter.
Away to the window I flew like a flash,
tore open the shutter, and threw up the sash

The signer repeats the sign FALL-ASLEEP (1:31-1:32) at the start of this clip, linking the temporal unity of falling asleep (a single sleep event) with the roof clatter. The other transition-method increases speed as the signer moves from the end of one clip to the beginning of the next. This happens between the clip above (1:31-1:38) and the clip following, corresponding to this couplet (1:39-1:47):

The moon on the breast of the new-fallen snow
gave the lustre of midday to objects below.

Once again we see a mechanism used in oral stories and poems being used in sign stories and poems. Rhythm here signals semantic groupings, and, therefore, is one more aid in comprehending narrative.

Repetition. The English poem uses little repetition. Our signer, in contrast, uses frequent repetition, typical of sign literature (Bauman, Nelson, and Rose 2006). Repetition helps with

language development; the first time a language unit is used, the child can note it, but on later times, the child is primed to mimic (Corrigan 1980).

Repetition in sign literature can be of several types: semantic units, phonetic ones, whole signs, and entire sequences (Sutton-Spence and Kaneko 2016)**. A**ll types occur in this ebook. Consider the line *The stockings were hung by the chimney with care.* This is rendered by a long clip (0:29-0:46). The signer tells us to take a close look, and we'll see that the house is decorated. He introduces the mantelpiece (0:36), indicating three loops there (0:37-0:39). He tells of red (0:40) stockings – three, again (0:41-0:42) – with white (0:43) cuffs (0:44-0:46). There is a natural progression: three loops prepare us up for three stockings, which prepare us up for three cuffs. In each set, the first, second, and third instance of a sign is given in consecutive points along a spatial line, moving from signer's left to right. The reader is primed by the first set to know what will happen movement-wise in the second and third sets, encouraging the child to make that movement with him. This is similar to how repetition in a pattern book primes the child for what will come next, encouraging the child to speak out along with the adult (an effective intervention for children from low-income backgrounds; Lonigan & Whitehurst, 1998). Since pattern books are useful in advancing literacy skills of children who are not entirely familiar with the language used in the books (such as ESL children; Peregoy and Boyle 1993), we expect repetition priming to be useful in advancing the skills of deaf children in hearing households.

Repetition of three's occurs again in the clip corresponding to the text line *The children were nestled all snug in their beds* (0:55-1:04). The signer tells us about three beds with a child in each, along that spatial line from left to right. After the last child is snug in bed, the signer has a hold, signaling the end of that rhythmic phrase.

Three's occur once more in the video corresponding to the line: *While visions of sugar-plums danced in their heads* (1:05-1:15). The signer signs CANDY (1:07), followed by pointing at three spots high in the air (1:08), then COOKIES (1:09), followed by pointing to those same three spots (1:10), and finally SUGAR P-L-U-M-S[2] (1:11-1:12), followed by pointing to those three spots (1:13). This instance of threes does not correspond to information in the text or illustrations; the text doesn't mention and the illustrations do not show candy and cookies. The signer introduced them to do vocabulary work. Candy and cookies are familiar. But sugar plums aren't. The signer deftly teaches the child what sugar plums are by inference at the general level (two similar things are followed by an unknown, so we assume the unknown is similar to the others) and at the particular level (two sweets are followed by an unknown, so we assume the unknown is a sweet).

Near the end of the poem (4:33 to 4:44) the signer uses repetition to reinforce memory and emphasize coherence: Saint Nicholas fills the three stockings we saw earlier in the story.

Phonetic repetitions occur often in the clips, as we already noted when we talked about rhyme.

Full sign repetitions occur often, as well, including ALL-AROUND (0:16 and 0:57), HOUSE (0:15, 0:56, 2:38), FAMILY (0:32 and 0:58). Sometimes the signer uses full-sign repetition to underscore meaning. Of the four clips corresponding to the four lines below, all but the third ends with the sign FALL-ASLEEP:

0:55-1:04 *The children were nestled all snug in their beds*

[2] We adopt the usual convention of using hyphens between letters to indicate fingerspelling.

1:05-1:15 *while visions of sugar plums danced in their heads*
1:16-1:22 *And Mama in her 'kerchief, and I in my cap*
1:23-1:30 *had just settled our brains for a long winter's nap*

The most striking repetition this signer uses is of sequences. He often reminds us he is Santa, who drives reindeers (1:55-1:57, 2:02-2:04, 2:12-2:13, 2:34-2:35, 5:06-5:07). The story closes with Santa driving that sleigh a final time (one quick move and a hold in 5:20).

In sum, the repetition in this ebook helps the child understand and memorize the narrative.

Transparency of literary techniques

Some literary techniques that call for cognitive sophistication when delivered orally are transparent in signing, making them accessible to the younger child. Much signing involves iconicity (Perniss, Thompson, and Vigliocco 2010), analogy (Sutton-Spence and Napoli 2013), and metaphor (Wilcox 2000; Taub 2001). The signing in this ebook revels in all. In the second clip here, a text simile is rendered by a sign simile:

3:55-4:00 *The stump of a pipe he held tight in his teeth,*
and the smoke it encircled .....
4:01-4:07 ……*his head like a wreath*.
….MY ALL-AROUND-FACE EDGES-OF-HEAD LIKE CHRISTMAS W-R-E-A-T-H

Another text simile is handled not with LIKE but by juxtaposing signs (perhaps more like a metaphor) in the line: *and the beard on his chin was as white as the snow* (3:51-3:54).

Finally, the signer introduces a graphic metaphor. In the clip corresponding to this line: *The children were nestled all snug in their beds,* (0:55-1:04), we see the three children in bed. The signer tightens his fingers around the last child (1:02), as a metaphor for snugness.

By helping the child become comfortable making the cognitive associations necessary for understanding similes and metaphors, our signer paves the way for the child to decipher text similes and metaphors later as a reader.

Attention as a key to (pre)literacy.

As noted earlier, for any techniques to encourage (pre)literacy, the child must pay attention. For the deaf child, that means visual attention. Further, since child-directed speech has been argued to play a role in speech development, one might expect child-directed signing to enter into our ebooks.

Eyegaze. Joint attention for sighted people is defined as an observer following the eyegaze of an interactant to a target (Corkum and Moore 1995). It is critical for a successful SRA for deaf children (Swanwick and Watson 2007) and for children with language-related special needs (Kaderavek and Justice 2002). The research on joint attention usually concerns live interactions. However, if a character in a video tries to interact with viewers, viewer-addressees visually attend to a video-narrator's gestures under the condition that the narrator holds a gesture or gazes at her own gesture (Gullberg and Holmqvist 2006; and see Huang et al. 2008 and Golos 2010).

Sign language literature makes use of at least six types of eyegaze (Kaneko and Mesch 2013) to potentially foster/scaffold joint attention, and all are used by our signers:

(1) narrator's gaze at the audience, at the outset and repeatedly.
(2) character's gaze, as when Santa looks around the house (0:57).

(3) spotlight gaze on hand(s), as when the signer alternates between narrator's and spotlight gaze in describing the stockings (0:29-0:46).
(4) reactive gaze on hands, showing how the signer feels toward what the hands tell, as in the clips about what the narrator sees on opening the window (1:39-1:47) and discovering a sleigh (1:48-1:57 – the reactive gaze ends at 1:55).
(5) panoptic gaze, where the eyes add information to manual signs, as when the narrator hears hoof beats on the roof (3:01); his eyes go upward and right, indicating the sound's source.
(6) prescient gaze, indicating future action by anticipatory looking, as in the clip for the line *And away they all flew like the down of a thistle* (5:00-5:04). At the end of this clip, the signer raises his eyes, and at the beginning of the next clip, he rides off in his sleigh.

Our signer's eyes establish joint attention by looking directly at the camera, inviting the reader to return direct gaze, and by looking at a target, pulling the reader's eyes toward it. In this way, an ebook offers a hook that no text (nor static illustrations) can match.

Child-directed signing. Some research concludes that child-directed speech (with exaggerated prosody) helps small children learn words (Golinkoff et al. 1992). Other research finds that exaggerated pitch differences in child-directed speech help preschoolers interpret others' emotions (Quam and Swingley 2012). We might, then, expect child-directed signing during SRAs to help deaf children gain vocabulary and better understand characters' emotions.

When deaf parents use child-directed signing, their signing is characterized by larger, slower signs and by signs that have lexical-internal repetition. Additionally, these parents often sign on the child's body or displace signs to occur within the child's visual field (Holzrichter and Meier 2000).

In this ebook many signs are, indeed, large and slow. However, the size and rate of signing corresponds to narrative structure, not visual salience of signs. In general our signer places verbs toward the end of a clip, and they are often larger and slower because they are the heart of the message. But nothing about his signing is child-directed – neither the type of repetitions nor the lexical items used (Holzrichter and Meier 2000). Rather, our signer develops reader vocabulary via using signs in isolation or in brief utterances, as well as stressing signs through lengthened duration and increased size (De Temple and Snow 2003, 18).

Why would our signer not have employed child-directed signing? The goal of our books is to increase the frequency of SRAs by making them so enjoyable that child and adult want to repeat the experience. That means our ebooks must appeal to the adult, too. On an adult reader, child-directed language soon wears thin. Hence we avoid it.

Use of the ebooks at home and at school

We suggest that parent and child share the ebooks we produce however they want, enjoying themselves. The parent might simply read text while the child looks at videos. This is the least interactive kind of SRA, but it still supports development of (pre)literacy skills. The child learns that books hold good stories and fascinating information. Sharing the ebook also means parent and child have shared experience and information, so when something comes up during the day that makes one or the other think about it, they can discuss it. In this way, the SRA strengthens family bonds.

The parent might, instead, point to illustrations and guess at what part of the signing is describing the visuals that the illustrations provide (such as the children snug in bed). He might ask the child to make guesses (perhaps about the mantelpiece decorations). He might imitate the story actions and invite the child to do the same. The parent could copy the signer and

encourage the child to. As signing knowledge grows (ideally in conjunction with classes in the sign language), parent and child could have simple conversations in sign about the story (not worrying about grammar details), and then about other things.

That is, interaction may range from minimal (like parallel play; Parten 1933) to prolonged and complex. So long as parent and child enjoy themselves, they are likely to repeat SRAs, engaging in interactive discussions of the stories. These unscripted and joyful SRAs might be as fruitful for the emergent deaf reader as unscripted and joyful SRAs are for the emergent hearing reader. At the least, parent and child will have fun.

Teachers of deaf children can help parents of deaf children by recommending these SRAs, and telling parents that there is no one right way to use them. Teachers have power; parents often see them as trusted professionals 'who should know' best (Marschark 2007, 5). A teacher's assurance that it's okay to engage with the ebooks however the parents want can make those parents relax about simply enjoying sharing a story with their child instead of incessantly assessing how much their child is (or isn't) learning.

Likewise, these ebooks in their youtube form lend themselves to classroom use. While everyone agrees that preschoolers need SRAs (Duusrma, Augustyn, and Zuckerman 2008; High and Klass 2014), elementary schoolers need SRAs, as well (Gambrell 2011). The classroom teacher in the United States must buck the race to fulfill all requirements of the Every Student Succeeds Act (2015) curriculum, and find time to read with the children for pure pleasure.

Since most deaf children are mainstreamed, these ebooks offer all students in the class the benefits of exposure to another language and culture: the classroom can learn about a sign language from watching and mimicking the clips. Students can discuss whatever they notice of Deaf Culture in the videos – and the teacher is free to augment with outside reading and experience.

The ebooks can be shared in the classroom the same way traditional picture books are – at circle time. Deaf and hearing children, alike, can enjoy the signing by watching and then discussing what they see. The teacher can encourage them to make up signs for objects that lend themselves to transparent visual representations – 'book', 'tree', 'house'. Then the teacher can go to an online dictionary and look up the actual signs. The class can compare and (implicitly, at least) learn something about what is likely as a sign articulation. The children can imagine occasions in which it would help to communicate silently. Children can be encouraged to take the ebooks home for sharing. They can be challenged to learn to sign a page for their parents.

For favorite stories, the teacher could try follow-up activities. The class might act out the story. Children could take turns telling the story through mime and gestures. Gradually, children could move more toward memorizing signing the particular story – modeling their signing after the clip. This is an opportunity for the deaf children in the class to lead the way.

Finally, the classroom that has hearing children with special needs might find that introducing ebooks with sign clips allows children whose needs concern language in a variety of ways to improve communication skills (Tincani 2004; Deonna 2014).

Table 1 outlines examples of ways ebooks can support a mainstreamed classroom.

Introducing a new topic:	Literature that relates thematically to a lesson can serve to acquaint a deaf student with the topic at hand.
Supporting deaf identity:	The deaf child who learns to sign the story in an ebook can teach the whole class, showing that ASL is a real language.

Supporting independent reading:	Literature in sign might soothe feelings of frustration and fatigue common among deaf children in a hearing environment.
Supporting the deaf child who has vocalization skills:	The ebooks have a voiceover. So those children who would like to practice their speech skills can benefit.
Using sign version as preview:	Deaf students can read the ebook on their own (perhaps at home) ahead of circle time in order to understand its content as the classroom teacher presents the text to the class.
Using sign version as review:	After a book has been shared in circle time, deaf students can read it on their own to further their understanding.
Comparing sign and text versions for self-assessment:	All students can find out how much English or ASL they are learning by counting the words and signs they understand before and after the book is shared in circle time.
Learning about iconicity:	All students can make up signs for things and then compare them to the real signs in the stories.
Improving home-school connections :	Ebooks allow deaf family members active involvement in their child's education, whether the child is deaf or hearing, even if their English skills are limited. Deaf parents can be invited to class to sign with the children. Weekend workshops on signing might be made available, with transportation costs covered by the school.
Supporting family literacy programs:	Assisting parents of deaf students in locating ebooks is a great way to start a family literacy program.
Raising awareness of multiculturalism:	Ebooks can raise all children's awareness through exposure to different languages and cultures.
Helping teachers and students learn another language:	Ebooks can help teachers and all children recognize that sign languages are true languages and can teach them some rudimentary sign. All children can be encouraged to bring the ebooks home to share with their families, so the children can practice signing at home.
Encouraging reading for pleasure:	Our ebooks involve no stress. No one should be 'tested' on them. They are purely for fun.
Supporting students with other language-related issues	Ebooks offer an augmentative communication system for children who have language-related issues, such as autism or AEA.

Table 1: Strategies for Using Bilingual-Bimodal Ebooks in the Classroom

Preliminary studies of effectiveness of our ebooks

The signers in the new ebooks naturally employ techniques that make it easy for readers to understand, mimic, and retell stories in their own way, as attested through preliminary studies.

In autumn 2013, 2014, and 2017 we brought the ebooks to the Pennsylvania School for the Deaf. Children at the Early Childhood Center through grade 4 engaged in SRAs with their teachers and with our students, sharing one-on-one or in small groups of up to four children with an adult. After initial SRAs, we distributed iPads to groups of children (again, no more than four) in grades 1 through 4 and observed how they shared them. Our students took handwritten notes throughout, since that method was suggested to us by the school administration as the least likely to divert the children's attention from the ebooks (a benefit to us) and the least disruptive of classroom atmosphere (a benefit to teachers).

Some groups hovered over an iPad together initially, then took turns going through the ebook alone. Other groups took turns from the start. Throughout, the children did not simply watch, they signed. These are the most prominent behaviors we observed:

(1) They mimic the videos as they watch them repeatedly, beginning as early as the second viewing.

(2) They tell the child next to them what the story is about, preparing them for it and telling them they are going to love it.

(3) In retelling, they vary the stories, exaggerating certain parts to show feelings or personal interests.

(4) They retell the ebooks together, as a game; one will elaborate on the other's sentence, sometimes pushing to extremes that leave them laughing.

(5) Throughout the above four behaviors they use higher level facilitative language techniques (such as asking open-ended questions and building off each other's elaborations of the story).

These five characteristics are typical of effective SRAs (Zevenbergen and Whitehurst 2003). Additionally, we recorded the following two behaviors:

(6) They play with the signs in the videos and transform them at will, claiming language ownership (Bahan 2006).

(7) They appropriate the ebooks as their own; they do not want teachers to explain them. Instead, they explain them to teachers. They are delighted these ebooks are designed for and belong to them, as deaf people.

The children in our studies went beyond being receptive, however. We introduced ourselves as wanting to learn from them what worked and didn't work. They told us which illustrations they liked, which orientation (landscape or portrait) they preferred, and whether they liked the formatting choices. They were the authorities, proud and happy to teach us. They made suggestions about other stories we might want to convert into ebooks, and were excited at the idea that there could be additional ebooks in the future.

Their teachers were also enthusiastic about the videos, and delighted to see the children discussing stories.

Rehana Omardeen (2015), a student at Swarthmore College at the time, also did an observation study of home use of ebooks in autumn 2014, with approval from the college IRB and agreement on the part of children and parents to be identified in publications that should stem from the study. She gave two families (hearing parents with a deaf child as well as hearing children) an iPad loaded with ebooks for a two-week period and encouraged them to do SRAs. During those two weeks, she visited their homes twice and video-recorded parent and deaf child (and sometimes the hearing children) engaged in SRAs. Both didactic-oriented stories produced

by VL2 for the older childn and our ebooks were on those iPads. The families were urged to share as many and as often as they liked, with some from the VL2 group and some from our group. Importantly, Rehana did not characterize each set of ebooks beyond pointing out that there were two groups, identifiable by their covers. After each recording session, Rehana sat with the deaf child and sometimes with the hearing siblings, as well, and conversed in a mix of English, gestures, and ASL about the ebooks, following the children's lead.

The children were delighted that a book would have a video inside it. They loved manipulating the iPad. The parents, however, did not bring attention to the signing during the SRA. They were convinced that signing was unnecessary. Their preschoolers had cochlear implants, and the parents trusted the professionals who had advised them to be patient and wait for success with speech. We also suspect they had been discouraged by medical professionals from signing with their children – a common, unfortunate experience (Humphries et al. 2012).

The children, deaf and hearing, on the other hand, were fascinated by the signing and eager to "perform" the signs they had learned from the videos. They expressed preference for our ebooks over the VL2 ebooks; those were the ones they opened up to show Rehana when they talked about what they enjoyed.

We do not have the resources to carry out a longitudinal study of the effectiveness of our ebooks. However, the preliminary work we just discussed plus the already-cited recent studies of ebook effectiveness in promoting (pre)literacy skills keep us optimistic. Further, the constant emails we receive from parents and children telling us how much they enjoy the ebooks encourage us to persist. At the very least, we are adding to deaf children's appreciation for the value of stories.

Conclusion

Those involved in raising and educating deaf children need to focus on pleasurable interactions over storybooks. Parents look to teachers for informed guidance. Teachers should encourage parents to relax with the ebooks, doing whatever they want, from simply reading to lots of play. They should let them know that enjoying SRAs with their children is their right as parents – and it is the children's right, as well. Deaf children need pedagogical ebooks designed specifically for their academic requirements, but they also need ebooks that are unadulterated fun. Deaf children and their parents have a right to such an anxiety-free experience.

More information about the new ebooks can be found at this website, where all can be downloaded for free:
https://riseebooks.wixsite.com/access

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