Before their very eyes: Enhancing the (pre)literacy skills of deaf children

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Abstract

The challenge of supporting literacy among deaf children is as much a linguistic one as an educational one, since a major stumbling block can be the lack of a firm first language foundation. It is critical to meet this challenge, given the range of serious negative correlates to illiteracy. Students on the two campuses of Gallaudet University and Swarthmore College collaborate to address this issue in an inter-institutional course in which we make bimodal-bilingual videobooks designed for enjoyable shared reading activities between deaf children and their caretakers. These videobooks bring a good signing model into the home and help develop a range of essential preliteracy skills.

Keywords: sign language, literacy, visual learning, inter-institutional collaboration, community collaboration

1. INTRODUCTION**.** Many deaf children struggle academically, where the finger is pointed at poor literacy skills (e.g. Qi & Mitchell 2012). Globally, illiteracy/low literacy is high: 85% of adults (regardless of hearing status) worldwide (UNESCO 2015) suffer from illiteracy/low literacy, which is a major correlate of poverty, un(der)employment, involvement in crime (whether victim or perpetrator), and poor health (Chaudhry et al. 2010; Kozol 2011; Lal 2015; Zhang 2021). Simply put, illiterates have a poor quality of life and fewer opportunities across the board (Cree et al. 2012). Further, illiteracy/low literacy is more common among women and among people in Sub Saharan Africa and areas of southeast Asia, where it is a culprit in human trafficking (Johannes 2010; Perry & McEwing 2013; Tarar & Pulla 2014). Illiteracy among deaf people in general is extremely high, regardless of all other demographic factors; under 2% of deaf children globally have accessible education (that is, education in a language that they understand; Murray

et al. 2019). Predictably, poverty among deaf people is also high, with all the ordinary negative correlates being even stronger than among hearing people (Humphries et al. 2012). Lack of education/literacy among deaf children correlates, as well, to neglect and abuse (Humphries et al. 2016a) and to prejudice against sign languages and deaf ways of being (Humphries et al. 2017). Thus, illiteracy is a social justice issue, and the matter of assuring literacy for deaf children is morally pressing in the extreme.

Linguists, in particular, should feel that pressure – poor literacy among deaf children is blamed on the lack of a firm first language foundation (Lederberg et al. 2013); so poor literacy among deaf people is a linguistic and cognitive matter even more than a matter of access to education (Humphries et al. 2014). In the early years of life, the brain is characterized by extensive plasticity; the child is primed to absorb information through perceptions and language (Huttenlocher 2009). The job is largely to segregate points of interest from background, store information about previous experience with points of interest, and test one's interpretations of the world against sensory input (Fahle & Poggio 2002). For most small hearing children, explicit literacy training is limited to school environments; their home environment, instead, allows them to learn implicitly, like sponges, soaking up information through perceptions, experience, and – hugely importantly – language. Small deaf children raised in a hearing environment often have a critically different situation in the preschool years; they may need explicit help gaining language competence (as described in the next section), and may need extra information input since much incidental learning that happens in an environment of accessible language (which most hearing children have) does not occur for them (Powers et al. 1998).

But beyond this explicit extra help, deaf children need freedom to learn implicitly just like hearing children – to reason their way through perceptual, experiential, and linguistic information during the time when their brains are ready to do exactly that. For this, deaf children need to have their visual attention captured and, crucially, sustained (Dye et al. 2008; Dye et al. 2014). One way to do this that involves linguistic activity is to engage them in shared reading activities based on enjoyable bimodal-bilingual videobooks (bi-bi videobooks). Such books are bimodal in that they present a storyteller signing the story – so the storyteller is using the gestural/visual modality – and they include the text of the ambient spoken language – so the text is a representation of a language delivered in the oral/aural modality. These books are bilingual

in that sign languages are independent of the (text of the) ambient spoken language(s) (Quer 2022).

It is appropriate, then, that linguists, given their training in first language acquisition, in the fact that language itself is a cognitive function independent of modality, and in the complexities of multilingualism, get involved as advocates in their communities and institutions for promoting both literacy and first language acquisition among deaf children. Classroom practices that involve discussions and reflection about diversity as well as service-learning activities contribute to students' understandings of social justice and, in fact, to social justice itself. Such activities demand intellectual honesty and, hence, recognition of one's responsibility, cultivating commitment to civic engagement (Campano et al. 2010; Mayhew & Fernández 2007; Smyth 2011).

Within this context, we designed a course and a website to support literacy among deaf children via producing bimodal-bilingual videobooks that are enjoyable, develop sustained attention, promote linguistic interaction, and, in these ways and others (as discussed below) help the child gain necessary preliteracy skills. To teach this novel topic we are using a novel collaboration that is interdisciplinary, inter-institutional, and responsive to community needs, desires, and feedback.

2. BACKGROUND**.** Before we describe our efforts, we need to address the matter of best practice in raising and educating a deaf child regarding language. Over 95% of deaf children in the United States are born into hearing families (Mitchell & Karchmer 2004). For approximately half those children environmental or (other) health factors that are more prevalent among lower income families are implicated in deafness (CDC 2022). Since the United States is among the wealthiest countries, this leads us to expect that globally an even higher percentage of deaf children are born into hearing families. These families often have no experience with deaf matters and need immediate guidance.

Controversy over what this guidance should be rages on and can be confusing (DesGeorges 2016). On one side are those who want deaf children to be 'cured' of their deafness and function as fully as possible in a hearing environment, raising the child strictly orally. Children do not learn to sign and families are discouraged from allowing their children any exposure to a sign language (for discussion, see Mauldin 2014, 2016). On the other side are

those who accept deafness as part of a child's identity, raising the child bimodally and wanting the child to function as fully as possible in both a hearing environment and Deaf World (for discussion and recommendations, see Humphries et al. 2016b; Napoli et al. 2015; Swanwick 2016). That is, the oralist side precludes a sign language; the sign side promotes bimodality, which includes a sign language and the text of the ambient spoken language and, if the child shows progress with it, speech, as well. The line between the two sides has been argued to be based on fear and prejudice (Humphries et al. 2017).

We plant ourselves firmly on the side of valuing the deaf child's whole and rich identity, a position fortified with persistently accumulating evidence. Deaf children with good signing skills tend to perform better academically than those with no or poor signing skills whether or not a child has hearing parents (Chamberlain & Mayberry 2000, 2008; DesJardin et al. 2017; Freel et al. 2011; Goldin-Meadow & Mayberry 2001; Hassanzadeh 2012; Holmer et al. 2016, Hrastinski & Wilbur 2016, Lederberg et al. 2013; Mayberry et al. 2011; Moores 2006; Scott & Hoffmeister 2017), and whether or not a child has a cochlear implant (Clark et al. 2016). Implanted children with deaf parents have higher intelligence quotients than implanted children with hearing parents (Amraei et al. 2017), a result consistent with the findings of many, that sign language benefits prelingually deafened children with respect to a range of cognitive abilities (Mayberry 2002; Humphries et al. 2020). Deaf children need receptive and productive communication with their families as early and as fully as possible for their cognitive, physical, and psychosocial health – something sign languages can offer from day one of life, but spoken languages cannot (Hall et al. 2019; Kushalnagar et al. 2020).

Many offer suggestions as to how to build a family language policy that is feasible for parents while protecting the health and language rights of the deaf child (e.g. Schwartz & Verschik 2013). The overall approach is that families should learn to sign as soon as it is known that the child is deaf, where parents should not worry about being perfect language models for their children, but, instead, focus on understanding and being understood by their children (Berger et al. 2023; Caselli et al. 2021). Fluent language models can be supplied by the local deaf community (or remotely, over the Internet, in the case of rural children)[1]. Likewise, we need a

[1] In fact, the majority of deaf people in the world live isolated from large deaf communities (Nyst et al. 2012), and the language needs of deaf children in these situations are precarious. Tele-intervention for deaf infants and

school language policy that protects the health and language rights of the deaf child; for a discussion of the shift from a special education view to a bimodal-bilingual (bi-bi) view, see Humphries (2013). An overview of research concludes that a bi-bi approach to deaf children's education is the best practice (Swanwick 2016), although often there are systemic barriers to a balanced bi-bi approach, since materials in text based on the spoken language outweigh materials in a sign language if there are any (Rouse 2020).

It is in this spirit that we aim to support deaf children's literacy. But our work may be surprising, in that we do not try to teach children to read text. That is an extremely difficult task (Easterbrooks et al. 2015; Kuntze et al. 2014) that we and our students are not qualified to attempt.

When people talk about literacy, they usually mean print literacy. Gaining print literacy is a more complex endeavor for deaf children than for hearing, even if they have a first language firmly in place. First, the text that hearing children face belongs to the spoken language they are surrounded by in school. That spoken language is already accessible to them (as their L1) or becomes more accessible over time (as they learn the L2). But that text for deaf children belongs to a language inaccessible to many of them and that stays inaccessible except through text. So, learning to read is a double task: learning the reading process plus learning the lexicon and grammar of the print language.

Second, writing systems are characterized in the literature by orthographic depth (Ziegler et al. 2010). In a completely shallow (that is, transparent or phonematic) system, each written symbol represents only one sound and each sound in the language is represented by only one written symbol. As we get further from that one-to-one correspondence, the orthography is said to be deeper and deeper. For hearing children, deep orthography makes learning to read more difficult, especially for younger children (Katz & Feldman 1981). But for the child who doesn't rely on sound, all writing systems are equally deep, that is, equally opaque and, thus, difficult.

Importantly, however, scholars conclude that, as a factor implicated in reading deficits in deaf children, depth of writing system pales in comparison to the children's 'drastically impoverished reading experience' (Kargin et al. 2012: 66). This lack of experience constitutes a major gap in deaf children's readiness for reading. In 1985 the National Academy of Education

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young children has been in use in Australia since 2002 (McCarthy et al. 2010); it's use in the United States is discussed in Rudge and colleagues (2022).

Commission on Reading stated (with respect to hearing children): '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 found continued support regarding hearing children (e.g. Trivette et al. 2010) and, if we take a loose understanding of reading aloud to children to mean sharing reading with children, it has found support regarding deaf children (e.g. Dirks & Wauters 2018; Trussel & Easterbrooks 2014; Trussel et al. 2017). Indeed, parental involvement in children's academic activities generally correlates positively with academic achievement, but for deaf children that involvement is a very strong predictor of academic achievement, probably because this kind of involvement entails effective communication between child and parent – something not guaranteed to many deaf children (Calderon 2000).

Mirus and Napoli (2018) look across evidence from many studies and argue that shared reading activities (SRAs) can form the bedrock of a range of cognitive skills, including reading. Through sharing a story, parent and child interact linguistically, increasing children's vocabulary and knowledge of grammar more extensively than when a child has a one-way (receptive) experience, whether with a text source (which most studies are based on) or a video source (Roseberry et al. 2014). For the hearing child, a good part of the expansion of vocabulary in their L1 happens effortlessly via listening to adults around them in conversation, watching television, overhearing telephone calls — that is, incidental learning — something lacking for the deaf child, with or without a cochlear implant (Convertino et al. 2014). For the deaf child in a hearing family, the expansion of vocabulary in their L1 (here understood as their sign language) requires concerted attention (Trussell & Easterbrooks 2014). SRAs pull child and adult together, with shared attention and language – expanding the child's vocabulary in a natural and fun way.

In an SRA, adult and child talk about what the characters do, how they might feel, why they behave as they do (*-Why do you think that fox is following that bunny? -How do you think the bunny feels? -See that hole? What do you think the bunny will do next?*). Such discussion adds to the child's knowledge about the world and develops skills such as inference, important to story comprehension (Sullivan & Oakhill 2015). Such open-ended questions (as opposed to questions eliciting a yes, a no, or a fact) encourage the child to exercise higher-level facilitative language techniques (Trivette et al. 2010). Further, questions like, 'If you were that bunny, what would you do now?' simultaneously bring the child into the story and distance the child from the story. For preschool children, in particular, relating the events of the story to experiences in their

own life and imagining themselves as a player in the story is critical to comprehension (Appleyard 1991), helping the children make meaning out of what otherwise might feel unrelated to their lives. Distancing oneself (that is, recognizing that you aren't really that bunny) can help the child learn characterization, plot, and Theory of Mind (Schick et al. 2007; Meristo et al. 2016). SRAs provide these significant advantages. But they come only when the SRA involves playful language interaction between child and adult (Deckner et al. 2006; Sonnenschein & Munsterman 2002). Simply reading the book with the child beside you, even pointing to each word as you read, without linguistic interaction, does not provide young children these advantages. Further, fun SRAs set the child up to have the motivation to do later recreational reading, a significant factor in long-term cognitive and academic achievements (Cox & Guthrie 2001), as well as in social inclusion (Clark & Akerman 2006) and social mobility (Kirsch et al. 2002).

Fun and play are important to the academic and psychosocial health of children (e.g. Alexander et al. 2014; Martin 2014). And fun naturally makes people want to repeat an experience. Mirus and Napoli (2018) attribute the dearth of experience deaf children have with SRAs to the lack of fun that too often characterizes SRAs for them. The majority of deaf children are born to hearing parents, a situation that can create tension. Parents can worry that their deaf child might not do well in school and might not have reasonable career possibilities. Parents who do not have a positive view of deafness can have difficulty supporting their deaf child's early literacy development through SRAs (Swanwick & Watson 2005). A typical scenario for the deaf child raised orally is the following (Mirus & Napoli 2018): the parents engage in SRAs, looking for indications of their child's academic potential. When the child's attention fails to be captured by static illustrations and oral reading – that is, when the child has no active engagement in the literacy activity but is limited to a passive role – they soon gaze around, seeking an opportunity to escape. This may not happen with the youngest children, but by around 24 months of age, the ease of SRAs is low, often rated very difficult by parents (DesJardin et al. 2017). The parent fears that the child has no interest in books and feels inadequate to engender that interest; the child recognizes parental stress and disappointment but may be bewildered as to how to relieve or please the parent, and the desire to escape grows. Such an experience lacks joy and many families may give up, which is one reason why the Shared Reading Project at Gallaudet University was developed to help hearing parents (Schleper 1995). In fact, some have developed

materials to coach parents in how to share books with deaf children, so as to support an optimal reading experience (e.g. the kits developed by the Visual Language and Visual Learning center at Gallaudet[2]).

Two of us, Gene Mirus and Donna Jo Napoli, took a different tack: they set out with their students to make videobooks that would provide the opportunity for fun SRAs between deaf children and their hearing family members without the need for coaching – so much fun that both would want to repeat the experience. Thus, they initiated the Reading Involves Shared Experience project (RISE), which produces bimodal-bilingual videobooks (YouTube videos) for SRAs and, in this way supports the development of (pre)literacy skills in deaf children. Gene offers this course as part of his regular teaching load in the Department of Deaf Studies at Gallaudet. His students in this course, with just a single exception, have been deaf and are signers. Donna Jo offers this course as part of her regular teaching load at Swarthmore College, where it is cross-listed in the Department of Linguistics and the Department of Educational Studies. Her students in this course, with just two exceptions, have been hearing, and all are required to have taken or to take concurrently an introductory course in ASL or in any natural sign language. The course has no prerequisites beyond signing knowledge, is an elective that counts toward the major in the stated departments, and attracts students who are majors as well as many other students. A good number of our students go on to pursue careers in education, including education of deaf children and children with other special needs, particularly needs involving language issues, such as autism.

Since students and faculty in the RISE project include members of the deaf community as well as hearing people, the course has a focus on learning how to be allies in addressing the needs of deaf children. Students and faculty also get feedback on their work from deaf children and their teachers in local schools for the deaf. From what the children and teachers tell us as well as from observing how they use the videobooks and what they point out to each other when they are huddling together sharing the videobooks, we learn about the interaction of such matters as the relative size of signer to illustrations and text, the benefits of different choices of where to place the signer on the page, the effects of size and type of font – all of which can vary according to the particular storyteller, the particular illustrations, and the particular story . Thus, in this

[2] https://vl2.gallaudet.edu/resources

course we partner with the community we hope to serve in order to better understand the linguistic and cultural needs and challenges of deaf children, forming the kind of partnership that many advocate for as best practice (Mallinson & Hudley 2014; Oberg De La Garza & Moreno Kuri 2014). Further, as we point out in Section 5, our more recent efforts accord with pedagogical best practice in two new ways. First, we partner with immigrant communities at schools for the deaf in America to provide text in Spanish when appropriate (Campano et al. 2016a). Second, we partner with deaf organizations globally to make initial videobooks and then guide them in making additional videobooks on their own (Campano et al. 2016b; Ghiso et al. 2019).

RISE was established in 2013. Electronic books incorporating signing were rare; we knew of only two such, in the UK and in America (Grimshaw et al. 2007; Malzkuhn & Herzig 2013). The development of free apps for making electronic books since then has led to more initiatives, but they are still few and they mostly serve children of the country they are made in. A notable exception is the World Around You project at the National Technical Institute for the Deaf (within the Rochester Institute of Technology), under the auspices of the National Association of the Deaf, led by Prof. Chris Kurz, which began in 2019[3] and is funded by the All Children Reading effort called Begin with Books. It makes workbook-styled games and videobooks for deaf children in 16 national sign languages (as of the writing of this article, fall 2022) and in some varieties of those languages, plus International Sign Language, where the products come from working with the local deaf community. The stories are written by the deaf communities.

None of these initiatives offer products created in the classroom, however. For the World Around You project, students were involved in the initial development of the platform as computer scientists, after which a commercial company was engaged (Second Avenue Learning, Inc.).

RISE, instead, is a classroom project and, with the exception of an initial small grant (as described in Section 7), has no extramural funding – which is ideal for a classroom experience, since there are no obligations to the goals of a funder.

[3] https://deafworldaroundyou.org/Stories

As of the writing of this article, RISE has produced videobooks in thirty-three sign languages and constantly seeks out new deaf organizations to partner with and support in launching initiatives for children in their countries. RISE videobooks are signed by a deaf person for whom signing is their preferred mode of face-to-face communication. Students and faculty of Gallaudet and Swarthmore[4] collaborate on production, and gather feedback from deaf children and their teachers to help in the revision process. Storytellers are encouraged to tell the stories using whatever techniques they believe are the best for the particular story, and students choose the stories and enhance the illustrations in whatever ways they believe will be best – thus, RISE products are art works, just as much as ordinary publishing house picture books are art works. The final videobooks are uploaded to the RISE website (https://riseebooks.wixsite.com/access) for free download.

The authors of this paper include the two professors who founded RISE — Gene being a former member of the National Theater of the Deaf and Donna Jo being a children's author — plus a past student of the RISE course, Melissa, who assumed a major role in the project from 2017 through 2022 and was the Director of Production in a recent outreach effort in 2020-2022. She is an alumna of Swarthmore, was a health worker for two years following graduation, and is presently a student at the University of Miami Miller School of Medicine. Thus, she has a professional interest in literacy, since low literacy is associated with a range of adverse health outcomes (Pignone & DeWalt 2006).

In the rest of this paper we give the available evidence as to the efficacy of bi-bi videobooks in developing preliteracy skills in deaf children. Then we discuss details of the RISE course. Next, we present evidence as to the RISE course's efficacy in instilling among its students a long-term commitment to promoting social justice by describing our COVID-19 outreach work. We end with plans for future experiential learning.

3. EFFICACY OF DIGITAL BOOKS IN GENERAL**.** Some studies show that videobooks allow for valuable SRAs in hearing families (Aliagas & Margallo 2017). Other studies conclude that videobooks and other electronic means of delivering stories impede SRAs (Parish-Morris et. al. 2013). However, as Giacomucci (2016) argues, these other studies look at digital stories for

[4] While the RISE course is offered on these two campuses, students from Bryn Mawr College, Haverford College, and the University of Pennsylvania have also enrolled.

hearing children with superfluous features that distract from the story rather than support it. Bi-bi videobooks for deaf children incorporate signing, which tells the story rather than distracting from it. Given that deaf children need to have their visual attention captured in order to access many sources of information (Dye et al. 2008), deaf children tend to learn better from multimedia materials that incorporate moving images (Gentry et al. 2005)[5] and they progress in their literacy skills from interactive reading with eBooks (Wauters & Dirks 2017) and from computerized programs that integrate signs and text (Holmer et al. 2017). Further, as Madej (2003) argues, digital stories offer new ways of presenting narratives and thus new ways of helping children to construct meaning out of their world. Indeed, some schools are introducing not just stories in a sign language, but multimedia textbooks across the curriculum (Rutkowski & Mostowski 2020).

Additionally, videobooks with signing offer the possibility for the child to watch the story repeatedly on their own between SRAs. In this way, they are comparable to 'talking books', which have been shown to advance literacy among hearing children (Wood et al. 2010). In a recent study, deaf children aged 6 to 13 years old who were users of American Sign Language (ASL) were asked to tell a particular story in ASL. Then they were shown a video of that story in natural ASL and asked to tell it again. Their retellings displayed a greater use of traditional sign storytelling techniques and inclusion of more details and more complex language structures in a longer narrative (Beal et al. 2021).

Mirus and Napoli (2018) show how videobooks can teach deaf children literary concepts that are otherwise opaque without sound, including rhyme and rhythm, which, with repetition, can lead to plot predictability— an aid to narrative comprehension (Bialostok 1992). Deaf children who are shown stories with rhyme in ASL use that to bootstrap English literacy (Gietz et al. 2020). Other prosodic features of reading aloud can aid narrative comprehension among hearing children (e.g. Veenendaal et al. 2014); again, sign storytelling can give the deaf child comparable benefits (such as varying speed of motion to indicate rate of motion in the activity being conveyed; Napoli & Mirus 2016). Videobooks can use the sign storytelling technique of role-playing to help the child understand differences in characters (comparable to read-alouds for hearing children when an adult adjusts voice pitch to match character). Sign storytelling

[5] Deaf children are often called visual learners, but Bradford (2004) argues that, in fact, 65% of all people are visual learners.

strengthens the child's abilities in a sign language as L1, and a firm L1 nurtures meta-linguistic awareness, language-transfer abilities, and cognitive readiness for reading (e.g. Chamberlain & Mayberry 2008) and writing (Rathmann et al. 2007) in the text of the ambient spoken language. Sign storytelling is rife with metaphor and simile (e.g. Sutton-Spence & Kaneko 2017) and that carries over to sign renditions of text stories (Mirus & Napoli 2018), helping the child to understand these literary devices. Sign language narratives can help the deaf child develop a healthy deaf identity (Sutton-Spence 2010) and authentic storytelling improves deaf people's education, from children to adults (Gillen et al. 2020), so storytelling in a sign language, even when the story originated in the text of a spoken language, may well do the same, so long as the signing is natural and not seeking to be a translation of the text, but told in the way a story created in a sign language would be told. We return to this point in Section 4.

4. DESCRIPTION OF INNOVATION: THE COURSE**.** In 2012, Apple came out with the free software iBooks Author (replaced by Pages in 2018), which allowed people to easily integrate videos into eBooks. That established the setting for the RISE course. It was offered for the first time in fall 2013, and at least on an alternating-year basis ever since. The innovative aspect of the RISE-course is the depth and complexity of its collaborative nature; it is interdisciplinary, inter-institutional, and responsive to community needs, desires, and feedback.

4.1. BRIEF OUTLINE OF COURSE**.** Classes meet on their own campus (Gallaudet and Swarthmore) at the same time every week, so students can interact remotely during class time. Three times during the semester we bring all students to one or the other campus, to allow prolonged interaction. The first time, Swarthmore students travel to Gallaudet early in the semester to get to know one another, form teams (as described below), and establish a collaborative atmosphere. The second time, Gallaudet students travel to Swarthmore after the first draft of the videobooks has been done so the whole class can discuss improvements. The third time, Swarthmore students travel to Gallaudet as our last class, to which the local deaf community is invited; we celebrate the completed videobooks.

4.2. QUALITIES WE SEEK TO INFUSE IN OUR VIDEOBOOKS. The first job of students and faculty is the selection of materials to use as a foundation for that semester's videobooks. RISE

videobooks are built on stories that consist of text and illustrations; they are traditional picture books except they include a signer telling the story. One might, instead, want to offer deaf children stories in a sign language alone, without text or illustration. And certainly, one should. But our goal is to attract deaf children and their families into an SRA for the reasons stated in Section 2. We do this through making the videobooks enjoyable for the deaf child and the (typically hearing) family members that might interact with them over the stories, the latter of whom may feel more at ease having text and illustrations. Books entirely in a sign language, in contrast, are more appropriate once all family members are more familiar with that sign language.

In RISE videobooks, the text and illustrations can help those family members who know little to no sign language feel comfortable at the outset. As the SRAs are repeated, the hearing family members' eyes might stray more and more to the signer, thus, allowing family members access to a good signing model right there in their home. In fact, hearing parents of deaf children say that learning how to read stories to their children is their preferred method of sharpening their signing skills (Weaver & Starner 2011); videobooks meet that need.

The signing in RISE videobooks is energetic and inviting; viewers can pick up signs quickly and interact with each other immediately using the signs in the story. Our hope is that family members will then be encouraged to take a sign language class. Children, whether signers or not, however, find pleasure in the signing immediately: they mimic and laugh. With their parents, they figure out what is happening, so that they 'get' the stories. And sometimes the children figure it out first, and are in the position of teaching other family members — a delightful position for any child. This is the sort of experience that people will want to repeat.

Because we are an unfunded project, we choose stories within the public domain that do not demand a copyright license fee. This includes old books, whose copyright has run out, and new books offered free on the Internet. We have *Humpty Dumpty, The Little Engine that Could, A Visit from Saint Nick* (aka *The Night before Christmas*), *Goldilocks and the Three Bears,* and other classics. Classics have two advantages (as noted in Collins et al. 2016). First, parents and grandparents are likely to be familiar with them and want to share them with children. Second, classic stories are part of the culture, thus they form part of the heritage of children born into that culture, including deaf children. This way when deaf children go to school and come upon a reference to a traditional tale, they do not feel excluded.

New books offered free on the Internet (such as through Creative Commons) have the problem that they risk not being of the quality of regular publishing house products. Certainly, the quality of books offered to deaf children should be as high as the best books offered to hearing children, given that in any country the number of bi-bi videobooks for deaf children ranges from zero to a few dozen, while the number of picture books for hearing children is often in the thousands (even hundreds of thousands). On the other hand, these new books are often more in line with modern situations and sensibilities. Additionally, when these new books are offered to the public, the public is given license to play with them. This is true of old books that have fallen out of copyright, as well. But because the old stories are well known, it's important not to stray so far from the original that the parents don't recognize it.

Students in the RISE course help choose stories that have experiences deaf children can relate to, with appealing illustrations. A story about a father and daughter who trek into the woods to see (and hear) a great horned owl, for example, can envelope hearing children – but exclude deaf ones. It is fine to have sounds other than people talking to each other in a story for deaf children, but such a story has more chance of being effective if those sounds are recognizable visually (as in the moving jaw of a yapping dog) or are not intrinsic to the plot.

Students confer on how to present the information in the story. Close alignment of signing with text may result in unnatural language that is less likely to captivate the intended audience. Let us give an example (from a book we have not produced): Ezra Jack Keats' *A Snowy Day* begins with the lines:

> *One winter morning Peter woke up and looked out the window. Snow had fallen during the night. It covered everything as far as he could see.*

The words are oriented toward children who learn via listening, but a deaf child is oriented to learn via vision. That means that a close translation in a sign language, a didactic translation, may be fun for the school-age child with a significant grasp of English (as in Educational Resource Center on Deafness 2015), but may, instead, be flat or confusing to the younger child. A rendering that is closer to face-to-face storytelling traditions in sign languages (Bahan 2006) is, we believe, more pleasurable and effective for this younger child. We find exactly that in Locy's (2010) ASL version. The signer starts by introducing herself, establishing a personal connection with the viewer. She then introduces the boy and says he fell asleep. Then she has him wake up, look around, and see white piled high outside the window. He runs to the window

and sees it has snowed. Here is the sequence of signs with the time stamp in the video of Locy telling the tale.[6]

BOY	NAME	P-E-T-E-R	NAME-SIGN	PETE	HE	FALL-ASLEEP	WAKE-UP	STRETCH
1:02	1:03	1:04	1:06	1:07	1:08	1:08	1:11	1:12

LOOK-AROUND	WINDOW	LOOK-OUT	WHITE	HIGH	GET-UP	RUN	SNOW	THRILL
1:14	1:15	1:17	1:18	1:18	1:18	1:20	1:21	1:23

The difference is not merely stylistic; presenting information properly to visual learners makes the difference between inviting them into the story or excluding them. By introducing the boy immediately, the signer directs the child's visual attention to that character (shown in bed in the illustration). Since proper names involve fingerspelling (i.e., spelling the name in the air with the manual alphabet: P-E-T-E-R), the signer follows this fingerspelling by giving the boy a sign name (here the P-handshape located on the chest). After that, every time speech/text might use *Peter*, the signer will not have to fingerspell, but instead just sign P on the chest. The act of giving the boy a sign name immediately indicates that he will recur in the story (so he needs a quick sign name) and alerts us that we should pay attention because he's an important part of the story. We now go through the boy's actions with him. Falling asleep happens over three seconds; waking up and stretching happens over three seconds; showing the snow everywhere, with multiple iterations, takes two seconds; being thrilled, also multiple iterations, goes on for three seconds. The repetition of SNOW (https://aslsignbank.haskins.yale.edu/signs/search/?search=snow&keyword=) and THRILL (https://aslsignbank.haskins.yale.edu/dictionary/gloss/1220.html) is part of storytelling

[6] We do not give snapshots of signers because the videos we discuss were made for educational and recreational purposes, and we do not assume we have the signers' permission to reproduce them as data in an academic work. We will not risk using people as unwitting research participants, especially since deaf people are so often scrutinized by researchers without their consent.

technique[7], reaffirming the setting and telling the child that snow will play a delightful part in this story.

Sometimes the determination of the order in which information is presented follows from the organization of the grammar of the particular sign language (and may conflict with order in the ambient spoken language) or from general factors that sign languages have in common, such as using space referentially. For example, the information of where Peter runs (to the window) is built into the ending point in space of the sign's movement (the point we have established as the window). Other times, the determination of the order of information follows from traditions within sign language storytelling, such as introducing a character before the character does an action, ordering events chronologically (not 'he saw snow out the window' but 'he looked out the window and saw snow') and embodying the character (you don't need to mention that Peter is the one looking out the window, because the signer has 'become' Peter) (Bahan 2006). These traditions facilitate comprehension of what happens (plot) and of how the characters respond to events (characterization) by inviting the viewer into the characters and giving them vicarious experiences that enrich them personally. All of this helps the deaf child realize that stories are worth the work that goes into learning to read. The students in the RISE course who are deaf signers are, per force, the authorities here.

But other times, all students get involved in decisions, particularly about matters of what might help children remember and organize information better, and of aesthetics. For example, in *The Slant Book*, a nursemaid pushes a baby carriage along a sidewalk, loses her grip and the carriage careens away. As the various people who see the carriage try to stop it, the signer shows their antics, but where should the illustration of the carriage be during all this? In the original book, the carriage is present on every page. The students were concerned that the carriage's presence could be a distraction from the bystanders' efforts – which would be a pity since those thwarted efforts are a big part of the story's humor. So, they presented the page with only the bystanders in the illustrations. Then, after the signer finished telling how each bystander fails to stop the carriage, an illustration of the carriage rolls across the page at a downward diagonal with

[7] Signs differ from one sign language to the next, of course. But the concrete noun SNOW is rendered in a very similar way in many sign languages (judging from the entries on spreadthesign.com), whereas the abstract noun THRILL is rendered in a wide range of ways (again, judging from the entries on spreadthesign.com).

the baby looking gleeful. The students' formatting decisions help to focus the child's attention, get across the chronological order of events, and underscore the humor.

The signers are deaf and they tell the story in the sign language they feel most comfortable with. Since Gallaudet draws students from around the globe, the RISE project produces stories in many sign languages with the text of the ambient spoken languages. So, RISE course students sometimes work on translation between texts, often from English into the text of another spoken language.

The signers of the stories are urged to imagine they are telling the story to a child and to use techniques they think are best; that is, to pretend like they are in a true sign-language storytelling situation, where they might even address the viewer. They aim to be friendly, inviting, energetic, and clear. Signers try out techniques and everyone gives feedback. Should the professors disagree with class decisions, the professors step back and the students take the lead; students are encouraged to own the stories – which is right, given that they are the ones onstage, so to speak.

In sum, students learn about the structure of the sign languages they deal with, about storytelling techniques in the visual modality, about how to capture visual attention, about what kinds of stories are culturally appropriate, about translation issues with regard to text. The instructional design allows students to gain the benefit of learning skills of collaboration within a setting of creating art to attain shared goals, with the professors orchestrating in a guiding rather than controlling way (Dillenbourg & Tchounikine 2007; Hämäläinen & Vähäsantanen 2011). In this way, these teams can create products superior to what any of the students as individuals could achieve alone (and see Stahl 2004).

4.3. MAKING THE VIDEOBOOKS**.** All class members work on production, which includes making a template for the story, inserting the text into the template, video-recording the signers, editing those videos, and inserting the videos into the template. Again, many decisions have to be made. All examples cited below are from videobooks on the RISE website.

Regarding the text, it must be visible without interfering with full visual access to illustrations and signer. Length matters: a long stretch of text can visually overwhelm the child. This can be solved by using captioning or by showing part of the text, then have it fade out, then showing the rest of the text. If there are characters in dialogue shown in bubbles on the page, one

way to help the reader know that the signer is telling the characters' words rather than the narrator's is to show only the text in the bubbles as the character signs that dialogue, then have the bubbles disappear and reveal the text the narrator says. We find this in *Coronavirus: Un libro in LIS*, in the sign language of Italy (contrast, for example, the pages at 2:49, 3:30, and 3:37).

Regarding the signer, again, location matters. The signer might be in a consistent frame, separated from the illustrations and reinforcing an external narrator. We see this in *Rocky the Cat who Barks* in ASL. Alternatively, the signer could be integrated into the illustrations, allowing the signer to interact with them when the signer role-plays. We see this in *Goldilöckchen un die drei Bären* in the sign language of Germany (look at 2:00, for an effective example). Likewise, the size of the signer can be consistent throughout or vary according to the character the signer is role-playing. The younger the expected/intended viewer, the more varying the size of signer can support understanding of each role. Alternatively (or additionally), one could help the child's comprehension by varying the (color of the) clothing the signer wears according to which character the signer is role-playing. In *Estela e Espumão: COVID-19*, in the sign language of Brazil, we see the signer small, dressed in a black shirt role-playing a child (see, for example, 3:34), and medium-sized, dressed in a red shirt role-playing a mother (see, for example, 1:58) and large, dressed in a green shirt role-playing a king (see for example 3:54).

Regardless of planning, often integration of text, illustration, and signer cannot be decided upon until the class sees how the whole fits together, often with the help of the children in the deaf schools we work with. For example, in *The Sea*, in ASL, the team originally planned to put the signer in the spot marked X in Figure 1. But this arrangement turned out to make the illustration and signer smaller than ideal. The final version has the text across the top, the illustration blown up and cut to emphasize the people, and a signer superimposed on the illustration, as shown in Figure 2 (where we have painted over the signer – as per footnote 6).

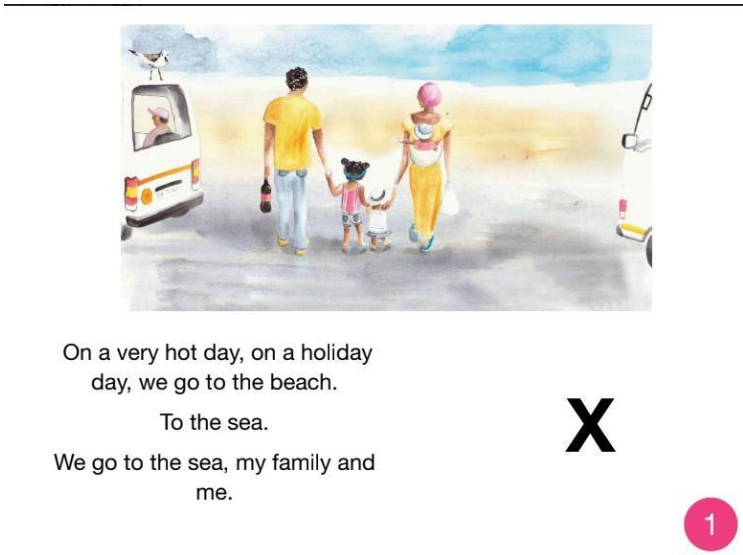

Figure 1: Plan for arrangement of text, illustration, and signer.

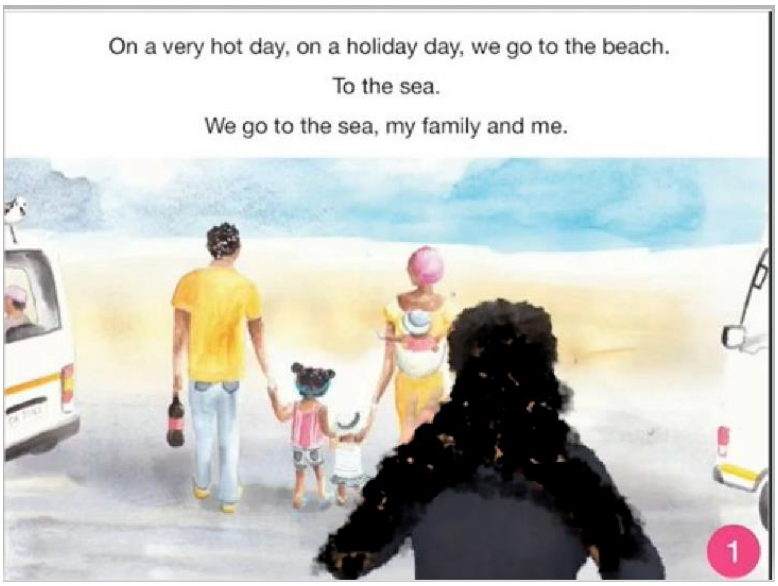

Figure 2: Final arrangement of text, illustration, and signer.

Whether pages turn to the left or right is a matter that usually depends on how printed books are organized in the child's country. But whether the text should be grouped into paragraphs or simply sentences may depend upon whether one way will better support understanding of which character is now speaking or taking action. Even choosing fonts can be a decision pertinent to comprehension: for example, having a dream sequence be in a different font or color from the other text may add visual clarification.

The students try to come up with a hook for each book – something extra to carry a child's interest. For example, in a story about ducks, the students placed an illustration of a nest

at the bottom right of each page, where the nest holds one more egg each time you turn the page, as seen in Figure 3, where we have clipped the bottom corner from pages 3 and 6. So the story incorporates a game of counting. In a story about the colors of the rainbow which had an incidental frog on one page in the original illustrations, the students made that frog appear on all pages in different locations and colors, making a game of searching for it. Figure 4 shows the original illustration with a frog plus two other pages with added frogs. Every time the RISE course is taught, new questions and possibilities arise and the class explores answers together.

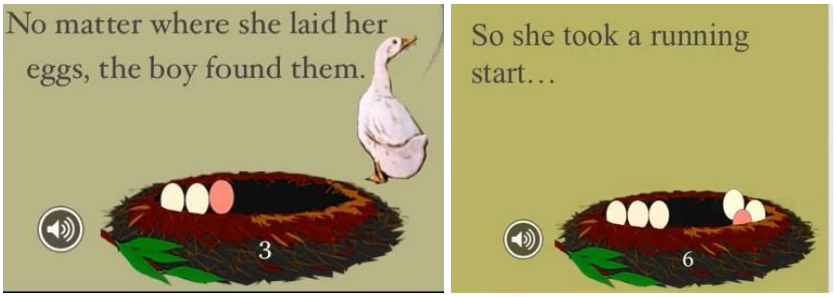

Figure 3: One kind of hook: incorporating counting into the nest illustration.

Figure 4: Another kind of hook: searching for the frog in each new color.

Students usually form teams of two to three people per videobook. When the teams have completed a first draft, the class watches and critiques it (this happens at our second meeting – when the Gallaudet class comes to the Swarthmore campus). Then the teams make a second draft. These drafts are brought to schools for the deaf for feedback. If there are five books to critique, the children in a class are divided into five groups. Each group is given a videobook to read/watch in an interactive SRA with the college students who produced it. Then the children are asked if they want to say anything about the book. All comments are recorded. The groups of children rotate through all five videobooks. At the end, all the children have a discussion with the students in the RISE course. Sometimes teachers and librarians join. The children are, thus,

partners; they help show us how to make the stories have meaning for them. This experience benefits us, but, also, them; they recognize themselves as active participants in cooperative inquiry that can influence their own learning, something new technologies afford so well (Fails et al. 2012). RISE course members get to see whether their decisions of storytelling and production worked. Sometimes they realize that an approach discarded earlier might, in fact, be more effective. Sometimes they learn that the story is better laid out in portrait orientation rather than landscape. If the children are drawn to a particular detail, that detail might be exploited in the next draft as the book's hook. We then make the final draft.

4.4. MONITORING THE METHODOLOGY AND EFFICACY OF RISE VIDEOBOOKS**.** The RISE project is an example of participatory research advantages over more traditional (experimental and quantitative) studies and it avoids disadvantages of such studies (as discussed below). Participatory research involves collaboration (Leavy 2017); in our research, arts-based products are designed through collaboration of students (both inside and outside the community we aim to serve) and community-based organizations (deaf schools). Together we collectively identify core issues, problems, and solutions. The trust built into the relationships that form via the negotiations and re-negotiations is a cornerstone of the research endeavor (Armstrong et al. 2022). Neither the professors nor the students nor the deaf schools are privileged: power is shared – a difficult situation to construct and maintain (Rose 2018). This kind of sharing of power is appropriate when the goal is to promote community action and change. In particular, we hope that deaf children will be so delighted with bi-bi videobooks that they will ask for SRAs with their adult caretakers, and the adult caretakers will be so encouraged by the children's enthusiasm that they will make SRAs part of their daily routine. Bi-bi videobooks produced in this way might have the ability to transform and emancipate, where illiteracy is a form of imprisonment.

Any statistically viable study (that is, quantitative study) to test the efficacy of RISE videobooks would need to include three groups: deaf children given RISE videobooks — designed to give pleasure (like picture books do for hearing children) and to promote language interaction between child and parent; deaf children given didactic videobooks — designed to teach children about language in an explicit way; deaf children not given/allowed videobooks. The three groups would have to be assessed for (pre)literacy skills at regular intervals over

several years. This means denying/depriving one group of children of videobooks. Given the visual nature of language, of attention, and of learning in general for the deaf child, such a study would have the serious disadvantage of risking impeding cognitive growth during the most important years for such development; it would be unconscionable and unethical.

Our work starts with consideration of background research about what has and hasn't worked, and constructing compatible hypotheses about what children might enjoy. We test initial hypotheses by making videobooks with varying styles and twists and gather feedback on them from children in deaf schools — immediately making them participants in the project. Using that feedback, we make improved drafts. Deaf groups around the world also give us feedback — thus, they also are participants in the project. For example, the idea of changing the size of the signer to match the character the signer is role-playing came from a group in Brazil.

Any project needs to gather results to judge its efficacy — which is complex when it comes to participatory activity. Nevertheless, there is positive evidence that our videobooks do what we hope they do. For one, children mimic the stories as early as the second viewing (Mirus & Napoli 2015). They retell the stories to other students, varying them to make their feelings about the plot obvious and to add details that personalize the stories. In these retellings, they exercise their linguistic powers by using higher-level facilitative language techniques (as discussed earlier). Most importantly, they have fun, claiming ownership of the ability to tell the stories in their sign language, and not seeing the teacher as the source of how to interpret those stories, but, rather, themselves and their classmates. Thus, the videobooks lead to complex language interactions that exhibit the characteristics of effective SRAs (Zevenbergen & Whitehurst 2003) just as the literature on language development would make us hope.

Further, our videobooks gain viewers quickly. A group in the People's Republic of China told us they had over 1000 views overnight for a Coronavirus book (a product of the outreach discussed in Section 5). A team in Turkey told us that within 24 hours of publishing the videobooks on Facebook, 11,000 people had viewed them and in that same period on Instagram, 13,000 had viewed them. Similar reports have come to us from Germany, Israel, Italy.

Additionally, a pilot study of the effectiveness of RISE videobooks compared two groups of families over three months (Omardeen 2015). One group was given an iPad loaded with didactic signing videobooks. The other group was given an iPad loaded with RISE videobooks,

which are aimed at promoting language use through interaction between parent and child. Her results showed more enjoyment and more frequent use of the iPads in the second group.

5. COVID-19 GLOBAL OUTREACH**.** When the pandemic led to quarantines in spring 2020, many deaf children were cut off from signers outside their families. For some, family members were at a loss as to how to properly inform them about the virus. We decided to help. But the RISE course was not being offered that semester. So, we contacted past students (many having graduated) and asked if they'd help produce videobooks on COVID-19. We had an outpouring of positive responses, even though all knew well how much time it would take.

We prepared templates for five books, then wrote to heads of deaf communities world-wide, asking if they could find storytellers. Again, we had an outpouring of positive responses, even though the signing itself, the translations of text and sign language, and the camera work take enormous amounts of time. We met on zoom with the signers, since most had never been filmed telling stories to children before. In the end 45 videobooks were produced in the sign languages and ambient spoken language text of 18 countries.

The response of our production volunteers shows that the RISE course engenders in students a commitment to serving the deaf community and gives them so much satisfaction that they are willing to give their precious time years after the course has ended. The response of global partners shows that the activity started by RISE has the power to inspire others to join. Several partners told us their country had never had videobooks for deaf children before, and now they plan on making them (Bulgaria, India, and Israel have already started). Our Norwegian partners told us they had made videobooks for school age children before, but not for preschoolers; now they are making them. Many global partners continue working with us (some with numerous videobooks, including France, Germany, and Turkey). All our global partners publicize the videobooks within their country to make sure they get into the hands of deaf children.

6. BENEFITS AND NEW EXTENSIONS**.** Through RISE, our students learn about linguistic diversity of the most extreme kind — between modalities. They learn basic differences in the structure of sign languages versus spoken languages. They learn about the sensitive period for language acquisition and the risk of linguistic deprivation for deaf children raised strictly orally. They

learn about issues in education and how to make stories gain the attention of deaf children. RISE raises students' language and cognitive-activity awareness.

The production and distribution of these videobooks reinforces linguistic diversity and language awareness globally through creative production and experiential learning in the community. The nature of the activity encourages others to join. Further, deaf associations in countries we worked with on the COVID-19 videobooks are now in contact with each other, allowing potential for extensive interaction.

Additionally, we made an association with the Nigerian National Association of the Deaf and Wesley University in Nigeria, and the RISE-course in fall 2020 produced two videobooks with them. And the Service-Center ÖGS.barrierefrei in Vienna, Austria, a center dedicated to ensuring inclusion and barrier-free access to information for deaf people, worked with us to produce a videobook in the sign language of Austria.

In fall 2021, a school for the deaf in Charlotte, NC, asked us if we knew of any videobooks in ASL with Spanish text, since for many children in their school, the home language is Spanish. Over that semester, we took some of our videobooks in ASL and converted the text to Spanish, so now parents in that school community can share the videobooks with their deaf children.

That same fall, we were approached by a researcher in Italy who works with a publisher that produces materials to help autistic children learn to read. Over the past more than 40 years, there has been research showing that learning a sign language can benefit some children on the spectrum (Schlosser & Wendt 2008). Our deaf collaborators in Italy agreed to work with us, and now RISE has three videobooks in the sign language of Italy that appear not just on our website but on the publisher's website (homelessbook.it).

In fall 2022, we worked with a deaf organization in the Philippines and in spring 2023, we worked with a deaf organization in Pakistan.

The course has taken flight. We are persistent in our goal of making bi-bi videobooks that children and families will get to experience and benefit from in enjoyable SRAs.

7. APPLICABILITY TO OTHER INSTITUTIONS**.** The relative proximity of Gallaudet and Swarthmore (125 miles apart) to each other made campus visits possible. The easy access to schools for the deaf near or on both campuses made feedback from deaf children easy to obtain. This travel,

however, costs money. Gallaudet University has supported the RISE course by paying for a university-owned bus with driver to bring students up to Swarthmore College. On the Swarthmore side, Donna Jo initially applied for and received transportation funds from the Dolfinger-McMahon Foundation for hiring a van and driver to bring students down to Gallaudet University. In subsequent years, Swarthmore has paid for transportation expenses, where internal funding has come from various initiatives of the Lang Center for Civic & Social Responsibility. While resources at many institutions may not include a bus with driver for academic events nor a center that distributes funding for academic projects that involve community engagement, many state and land-grant universities in the United States have funding earmarked for "outreach" that courses might well be able to tap (McLean et al. 2006). Additionally, many higher education institutions around the globe have funding for students with disabilities (although such funding is often threatened, Vincent & Chiwandire 2019), and a course that involved deaf students and engaged the local deaf community might be able to tap such funds. Further, there are multiple foundations, such as the Dolfinger-McMahon Foundation, that give small grants for socially-responsible innovations in education, some of which restrict their funding to residents/institutions of the state they are in, decreasing the competition pool.

However, there are ways to incorporate the innovations here under different geographic and economic conditions without having to apply for external funding. With respect to courses aimed at supporting literacy among deaf children, a linguistics course which had primarily hearing students would need to team up with appropriate members of the deaf community. Apps such as Zoom facilitate such partnerships. There are only a handful of universities whose study body is largely deaf, however there are centers for deaf studies at many universities, and such centers tend to have a community of deaf scholars working and/or attending classes there. High school classes in deaf schools are another potential source for collaboration. Storytelling, like poetry, is among the 'spheres of freedom' (Greene 1988) and high school students can welcome the videoboo- making experience not just as a service to others, but as a chance to exercise authority with respect to language and culture in the eyes of hearing collaborators, and as a possibility for 'critical awareness and reflection with self and others' (Jocson 2005: 134). All but three states (Nebraska, Nevada, New Hampshire) have at least one public school for the deaf, and one of the aberrant three has a private school for the deaf (Jamaica Christian School for the

Deaf in Nashua, NH). Again, Zoom and similar apps are now commonplace to these high schools, allowing collaboration at a distance. Testing out the books on preschool and elementary school deaf children can also be done via Zoom, with the guidance of an educator at the deaf school.

Many hearing children, as well, are at risk of illiteracy for linguistic reasons, where often these reasons are speech-related, rather than language-related. Bimodal-bilingual videobooks might very well, then, offer benefits to these children. At RISE we don't know yet whether our videobooks produced for neurodiverse children in Italy do, in fact, bring joy to many children and their parents. But the very idea of possibly serving yet another group of children and their families motivated our students to agree to undertake the challenge immediately. The possibilities are multiple.

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