Education, Games, and Sign Language

A Literature Review

Ashley Wilson

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Since the 1970s American Sign Language (ASL) has been recognized as a full language and since then many advancements have been made. Modern technology has reached a capacity to truly assist and integrate into the lives of the Deaf and hard of hearing (DHH) as well as hearing. With technology today we can create realistic 3D signing avatars, users can easily author sign language content with software tools, written English can be translated to ASL, spoken English can be translated in real-time with speech processing, and signs can be read in real-time using 3D image processing. Learning and translation tools exist on every platform: web, desktop, and mobile. With today's technical advancements, we are able to use technology to create true solutions rather than cumbersome tools and basic translation implementations.

Despite all these amazing advancements, tools are still not a replacement for true understanding. Interpreters and methods for learning sign language cannot be substituted with technology. Especially, in the home, where less than five percent of deaf children have at least one deaf parent (Mitchell, Karchmer, 2004). This is where parents must learn a second language while simultaneously teaching their child a first language which is not their own native one. This is where researchers are now looking to assist with technology.

With the high video processing power of personal computers today, computer generated graphics are commonplace. It shouldn’t be a surprise that 3D avatars are the next technology to assist sign language learning. Avatars are used in storybooks to help deaf children learn written English, they are used in

educational software for translation purposes, but very little projects seem to focus on teaching children sign language.

CopyCat is a 3D immersive virtual environment which uses game techniques to teach children American Sign Language (ASL). The technology uses a camera and tracking gloves to read the child's signs and provide feedback. The research team is currently working on more technical aspects like utilizing the Microsoft Kinect™ rather than analyzing the system for learning effects.

A Turkish team developed a game to go along with a physical humanoid robot to tutor preschool children in Turkish Sign Language. They are also at very technical stages because their robot only had three fingers and sign recognition proved to be difficult with users who didn't already have some sign language knowledge. However, they did find some positive effects showing that a robot tutor can be used to teach sign language to children.

So while 3D avatar and robot tutors have the potential to provide children with the personalized instruction they need, it doesn't seem to address the needs of the parents. Xu (2013) really considered the needs of hearing parents of deaf children. The main concern was time. Parents don't have enough time to learn a second language. So, she researched a mobile solution for learning ASL incrementally on their mobile phones. Her research led to an application called SMARTSign.

SMARTSign implements more recent concepts in learning and focuses on giving parents control over their learning. The application used video clips to teach vocabulary to users at their own pace. They found that recognition of signs improved, and parents liked the application. However, the production ability of signs was not affected, and parents wanted more than just vocabulary.

While this application utilized many learning theories and was designed based on user's needs, it does not address a very important aspect. Xu (2013) justified the need of her research that "hearing parent should be comfortable to use signs all the time, even when they are not addressing their deaf child directly." In order to facilitate this, siblings and extended family members must also be considered. As Napier, et al. (2007) points out "the deaf child will miss out on much of the incidental learning that happens by 'overhearing' the conversations of other people if siblings and extended family do not sign."

Because of this we need to consider a sign language learning solution that involves the whole family. So, we must first begin by understanding how to best teach sign language to hearing individuals.

Unfortunately, there is a gap in research of second language acquisition and pedagogy for gestural languages. There are few journal articles, let alone models and theories concerning this topic. To be fair, sign language is a second language for most. And many modern curricula rightfully adapt aspects of second language acquisition. But even though some principles can be applied to

sign language learning, there are some distinct differences between gestural and spoken languages. The modality, spatial expression, and written form.

At the very basic level of information perception and processing we can start comparing the two languages. The modality of of sign language is visual rather than auditory. This allows for the structure of sign languages such as ASL to be "heavily influenced by the ability to display meaningful streams of information simultaneously" (Quinto-Pozos, 2011). This is a huge factor to overcome for the hearing learner as spoken language is sequential.

In researching trends in teaching Czech Sign Language, Langer (2012) emphasized the effect of the spatial qualities of sign language. He supposed that it may require the student to use a means of expression that isn't communicated with spoken languages. It might be similar to how some languages have words or phrases which have no translation into English. An analogy could be the equivalent of a fish learning that they've been swimming in water their whole lives. Therefore the learner is not simply learning a language, but a whole new way to communicate. And it might benefit the learner to be aware of this. "Language learning in the visual modality might allow the learner to take advantage of other cognitive skills (e.g., visual-based memory and the management of non-linguistic spatial phenomena)" (Quinto-Pozos, 2011).

In addition, there is no commonly used writing system for sign languages (Xu, 2013). Typically, American Sign Language (ASL) is represented in glosses, but this is more of a partial translation to written English. HamNoSyn is a

language-agnostic written form to represent sign languages, but it is complicated and has not gained wide acceptance. A written form of a language provides learning benefits such as review and refinement which isn't possible with visual-only languages. In Xu's research, she recognized this need and provided a way for users to record themselves and self-evaluate. However, if the user does not know the correct sign then it would be impossible for them to evaluate themselves sufficiently.

Despite these differences, learning sign language as a second language still shares common aspects as any second language. So, though we might not know "the best ways to teach ASL so that adult hearing learners can make the most gains" as Quinto-Pozos laments, we can still make some best guess approximations through second language acquisition theories and also through research of a very important group within the deaf community: hearing parents.

Mitchell and Karchmer (2004) found that less than 5% of deaf people are born to deaf parents. This means that the majority of deaf children's parents are learning a new language to communicate with them. There are many solutions available to parents: community classes, instructor-led classes, online tools and courses, and mobile tools. However, as mentioned with the SMARTSign project, parents have unique needs when it comes to learning a second language. Napier, Leigh, and Nann (2007) analyzed the available curriculum for Australian Sign Language (Auslan). They found that parents needed a unique set of

components for learning Auslan as second language.

Many courses nowadays are designed with the primary goal of language learning: to communicate. However, these courses do not consider with whom the parents want to communicate: their child. For this reason, curriculum should not be “adult talk” (Napier, et al. 2007). Communication strategies and not just language components should be taught. For example, the different way to grab your child’s attention. Also, for optimal learning parents should be able to freely make mistakes. Table 1 below summarizes many of the similar principles found during this literature review.

American Sign Language (ASL) has been rated to be equivalent to learning an L2 spoken language. Xu (2013) states that ASL is as difficult for English speakers to learn as Japanese. Though we do not have clear learning theories for gestural languages there are some principles which can be applied from second language acquisition theory. Specifically, Quinto-Pozos (2011) selects content-based instruction (CBI) and task-based language teaching (TBLT) to be applicable.

In CBI, students learn content which interests them. For most learners it would be “by focusing on common ways in which people interact” (Quinto-Pozos, 2011). This is supported by the research done by Napier, et al. (2007) where they advised that “signs should be taught in context, with a focus initially on the family home, people and objects.” Xu (2013) also reiterates that parents

are most interested in learning vocabulary associated with children's stories. With TBLT, sign language tasks can be oriented towards communication with their children: storytelling, play, visual games, family weekends, etc.

Table 1 summarizes principles of learning a second language with some specifics of hearing parents learning sign language as a second language.

Clear Communication Goal • Make the goal the ability to communicate with the target language. • Communication with children and not on 'adult talk' • Impact of the learning goal on overall learning	Langer, 2012 Napier, et al. 2007 Xu, 2013
Immersion • Immersion in a natural signing environment	Langer, 2012 Napier, et al. 2007
Motivation • The desire, motivation and opportunity to communicate in the target language. • Signs should be taught in context, with a focus initially on the family home, people and objects, with concentration on more abstract concept outside the home later. • Content-based instruction (CBI) • Parents are most interested in learning vocabulary with children's stories	Langer, 2012 Napier, et al. 2007 Quinto-Pozos, 2011 Xu, 2013

Activities for Frequent Use • Dialogues, practice, communicative activities and games are the basis for meaningful contact with the target language. • Daily activities, so that language can be developed within a family context. • Task-based language teaching (TBLT)	Langer, 2012 Napier, et al. 2007 Quinto-Pozos, 2011
Learning Principles • Mistakes are an important and integral component of learning. • Initial lessons should allow for plenty of discussion and questions.	Langer, 2012 Napier, et al. 2007
Second Language Acquisition Principles • Students should self-study lexical components and the direct lessons with the teacher are used to teach grammar and conversational skills. • Socializing with deaf adults and children.	Langer, 2012 Napier, et al. 2007
• Both theoretical knowledge and practical skills are necessary. • There is a need to teach visual communication techniques and communicate competence, rather than just vocabulary	Langer, 2012 Napier, et al. 2007
Culture • Knowledge of Deaf culture • Cultural aspects of deafness	Langer, 2012 Napier, et al. 2007
Communication Strategies • The communication norms of the Deaf • Learn communication strategies such as play and storytelling, how to read picture books, how to play effectively using sign language, and appropriate strategies for gaining their deaf child's attention	Langer, 2012 Napier, et al. 2007

Table 1

So, many principles of second language acquisition can and have been applied to sign language instructional design. And just as importantly, the needs of hearing parents of deaf children are being addressed. Despite some researchers finding niches in their respective fields, there are still a lot of possibilities to create tools and games for helping people learn sign language, and a lot of research opportunities for sign language pedagogies.

Bibliography

Langer, J. (2012). Modern Trends in the Teaching the Vocabulary of Czech Sign Language. *Procedia - Social and Behavioral Sciences*, *55*, 635–644.

Mitchell, R. E., & Karchmer, M. A. (2004). Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies*, *4*(2), 138–163.

Napier, J., Leigh, G., & Nann, S. (2007). Teaching sign language to hearing parents of deaf children: an action research process. *Deafness & Education International*, *9*(2), 83–100.

Quinto-Pozos, D. (2011). Teaching American Sign Language to Hearing Adult Learners. *Annual Review of Applied Linguistics*, *31*, 137–158.

Xu, K. (2013, May). *Facilitating American Sign Language learning for hearing parents of deaf children via mobile devices*. Georgia Institute of Technology.