Utilizing Life-like, 3D Animated SigningAvatar® Characters for the Instruction of K-12 Deaf Learners

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Company Background

- Vcom3D, Inc. is a leader in research and development related to the instruction of K-12 Deaf and Hard-of-Hearing (Deaf/HH) students.

- Our SigningAvatar® characters provide a striking increase in many children's attention span, their level of engagement, and academic results.

- During an evaluation at the Florida School for the Deaf and Blind (FSDB), the increase in comprehension when shifting from *text-only* to *text accompanied by sign language* by use of the SigningAvatar technology was **17% to 67%.**

Early Research:
Life-Like, Expressive Avatars

There was a huge explosion, I pulled my head back suddenly and squinted my eyes.

Life-like, Expressive Avatars for the Instruction of K-12 Deaf Learners

- National Science Foundation SBIR Phase 1 funded research.
- This project was conducted in partnership between Vcom3D and the Laurent Clerc National Deaf Education Center at Gallaudet University.

Laurent Clerc National Deaf Education Center
Gallaudet University

- Goal - To identify signing styles of both genders communicating in American Sign Language with young students.
- Based on the “Shared Reading Project” principles created by David Schleper (1997).

ASL readers go well beyond strictly interpreting English text…

Based on Schleper's "Principles for Reading to Deaf Children", Vcom3D identified several principles that could be addressed using our Sign Smith Studio sign language authoring tool:

- Deaf readers re-read stories on a storytelling to story reading continuum.
- Deaf readers make what is implied explicit.
- Deaf readers adjust sign placement to fit the story.
- Deaf readers adjust signing style to fit the story.
- Deaf readers connect concepts in the story to the real world.
- Deaf readers use attention maintenance strategies.
- Deaf readers engage in role-play to extend concepts.

- During the same project, researchers found that appropriate use of facial expression is an important communicative skill for teachers working not only with Deaf/HH, but also with hearing students.

- Although the importance of facial expression is recognized, more research is required in order to develop a comprehensive language model of how the face is used to communicate in different contexts and in different “registers”.

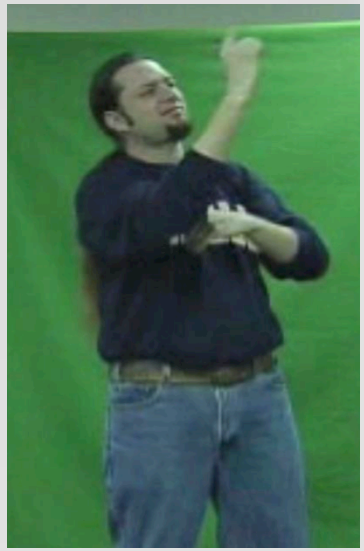
- In order to enhance the expressiveness of our Virtual Tutor (also known as SigningAvatar® characters) simulations, Vcom3D is researching the nuances of how the face and body are used in communication - in ASL, and teaching in general.

- The outcome of our research, based on videotaping teachers, is to improve the quality of our Virtual Tutors in areas such as modeling of facial expression, connection of these expressions with their meanings, and to support the instruction of children and teachers using our Sign Smith Studio product.

Using the developed proof-of-concept system, we videotaped a short story signed by a male teacher, Jason Stewart, at Kendall Demonstration Elementary School (KDES).

Vcom3D analyzed the video, wrote an English transcript, and animated the story.

The animated version is 4 minutes of a story called "*The Forest*".

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Evaluation Process

- Students at KDES and American School for the Deaf participated in the evaluation process of our newly developed “Life-like Expressive Avatars”.
- The students were evaluated in their comprehension of the materials with and without the aid of the software.
- The students were asked to:
  - Read a few passages and answer comprehension questions without using the software.
  - Approximately two weeks later, the same reading passages were shown with the aid of the 3D animated story.
  - Take another comprehension test.

Initial reactions from KDES Students:

"It helped me to correlate with the signing and reading English. It also helped me to reinforce what I was reading allowing me to compare stories. I thought the avatar looked like a real person."

"The avatar signed clearly and I was able to fully understand the story better. I felt I was able to learn more."

"I would much rather have the avatar sign to me over a Deaf person if I had an iPod based on the avatar's ability to show actions and expressions."

"I would much rather view ASL than reading English, and would rather have avatars during testing. It did help me understand the questions better."

"I felt I was able to understand the story more in depth, helped me to read better, and the avatar made no mistakes in signing. It was so cool!"

Initial reactions from KDES Teachers:

“What I liked most about the avatar was he had smooth movements, clear signs, and the face was very expressive.”

“My students liked the animation -- the story became more interesting and understandable.”

“The signing of the avatar and facial expressions was clear.”

“The avatar was identical to the actual signer.”

“I think over time that life-like expressive avatars could support the development of English reading comprehension for unaided reading.”

“The project was very useful for my students; it helped a student who had trouble understanding the text during the post-test.”

Educators' Survey Data Summary- KDES and American School for the Deaf (ASD)

Question	Average
1. Was it easy for your student to view the life-like expressive avatar(s) for reading comprehension?	9
2. How motivated were your students to use life-like expressive avatar(s) for reading?	9.8
3. How much do you think the life-like expressive avatar(s) supported the reading comprehension of the students who used it?	9.3

Mobile Language Reference for Deaf & Hard-of-Hearing K-12 Students

U.S. Department of Education SBIR Phase 1 and 2 funded research.

As a result of Phase 1, Vcom3D will show evidence of the initial success in utilizing mobile devices in terms of making ASL educational information accessible to K-12 students – anytime, anywhere! Our research continues…

Phase 1 Evaluation Results

The following average evaluations by upper elementary and middle school educators of Deaf/HH students (Hurdich and Sims, 2007):

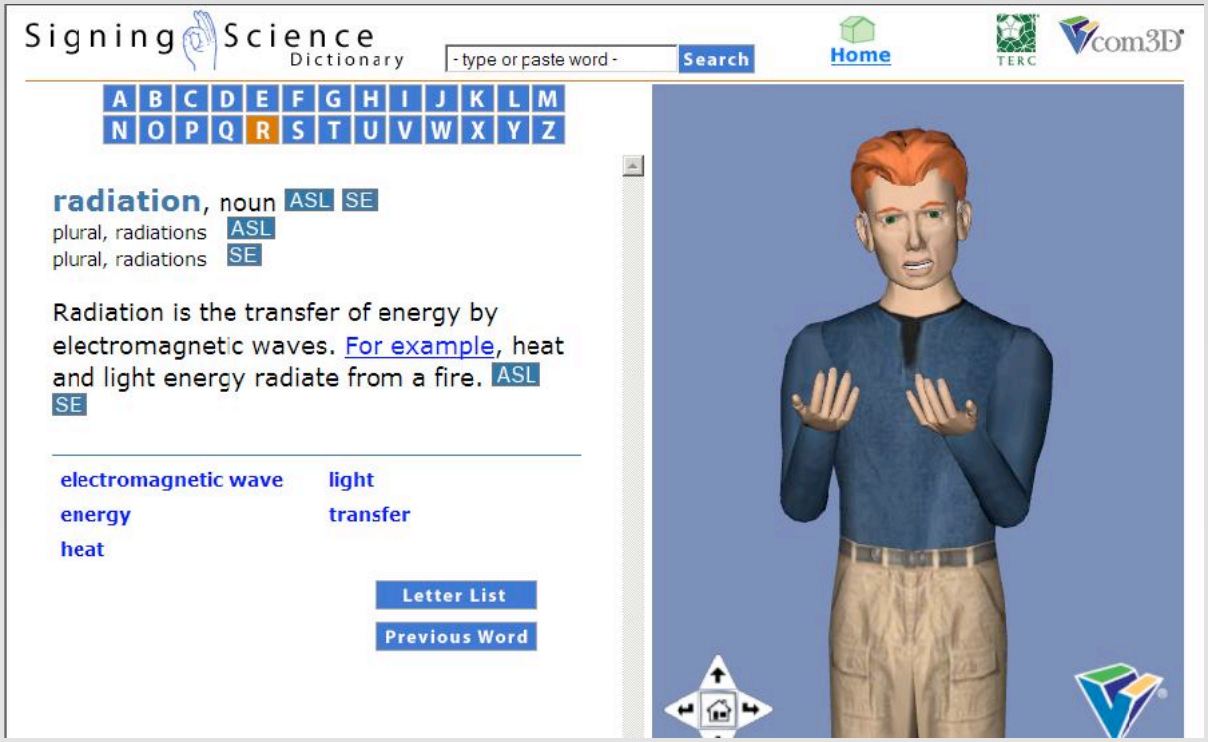
Ease of Use: 8.3 out of 10

Motivation: 10 out of 10

Supported Reading Comprehension: 7.7 out of 10

Phase 2 Begins…

- In October 2007, Vcom3D, Inc. began the Phase II SBIR project (which runs through September 2009).
- This reference tool includes animated translations from English to ASL of multi-meaning terms, idioms and difficult words that Deaf students often face in literacy.
- Technology Goal - To develop an exemplar Mobile Language Reference for Deaf/HH K-12 Students using the Apple iPod Touch.
- Educational Goal - To boost a student's ability to learn ASL grammar and to reinforce a bilingual, bicultural educational approach.



The mobile devices include definitions and explanations of idioms, scientific terms, multi-sense and unfamiliar terms which Deaf/HH students often have trouble understanding.

Phase 2 work is to convert the existing Signing Science Dictionary to be accessible via mobile devices.

Phase II - Mobile Application

Prototype shown on an Apple iPod Touch

Significance and Implications of Research Projects:

- The NSF-funded research will result in improved, computer-based reading instruction for the 50,000+ K-12 Deaf/HH students in the U.S. whose first language is ASL. Currently, Deaf children are delayed in developing language skills, to the extent that the average reading level of a Deaf high school graduate is no greater than 4th grade.

- The Dept. of Education-funded research will result in a Mobile Language Reference tool that can be taken anywhere to supplement the curriculum of the Deaf/HH student. It will contain a library of definitions that are often difficult for these students to master.

Thank You

- Please visit the Vcom3D booth during the conference to receive your discount code to purchase our products or sign up to receive more information.

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