Supplementary Evaluation Report

# *Increasing Undergraduate Student Interpreters' Fluency and Accuracy in Interpreting STEM Content*

(Award #2313816)

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## I. Introduction

Results of testing use of the Signing Bioscience Lexicon (SBL), Signing Bioscience Dictionary (SBD), and Fingerspelling Video Tutorials (https://signsci.terc.edu/video/SBD/IUSE/) by student interpreters at Eastern Kentucky University (EKU) showed significant improvement in their fingerspelling skills and in their ability to sign terms used in the study of genes, and heredity. However, they showed no significant improvement in their ability to interpret genetics content fluently or accurately (https://sign-sci.s3.us-east-1.amazonaws.com/publications/IUSE_Evaluation_Report_2025.pdf). These results as well as observations of students using the materials and interviews with teachers indicated the need for built-in opportunities to practice learning along the way. To this end, the Lamar team developed an additional video that included discussion and review of the fingerspelling principles as well as ongoing hands-on practice (https://signsci.terc.edu/video/SBD/interpreters/fingerspelling_review.html). To test whether this new more detailed video aided faculty in teaching their students how to use the fingerspelling principles from Van Mannen, we recruited two additional sites for a new study.

## II. Methodology

The Lamar team, under the leadership of Co-PI Clark, had primary responsibility for implementing the supplementary evaluation. Clark, with input from PI Vesel, had primary responsibility for preparation and analysis of data. Vesel had primary responsibility for documentation and reporting.

Ball State University (Muncie, Indiana) and the University of Northern Colorado (Greeley, Colorado) provided participants for the evaluation. Recruitment resulted in a total of 25 participants studying to be interpreters (10 from Ball State and 15 from Northern Colorado). IRB approval for the study was obtained from Lamar University's IRB. Prior to beginning, participants completed Lamar's requirements for working with human subjects. This involved reading and signing a consent form. They also filled out a Participant Information Form. This form provided information for use during analysis such as ASL course level and sign proficiency level. They then completed 6 sessions one-hour out-of-class sessions during which they used the SBD and SBL to learn the signs and meaning of terms included in the category of Genetics and Heredity and the video that incorporated discussion of the fingerspelling principles and practice activities. The sessions were led by members of the deaf education (Ball State) and interpreter training (University of Northern Colorado) faculty program who instructed students during the year. Prior to working with students, members of the Lamar team had met online with them to explain what they would be doing and go over the fingerspelling principles they would be introducing and having students practice.

Data collection involved completion of a Pre-Interpreting Sample and a matched Post-Interpreting Sample dealing with the topic of genetics for the University of Northern Colorado group. They were presented as spoken language presentations using pre-recorded videos. The interpreting samples for each participant were video recorded and used for coding and analysis. Scores provided information about participants' ability to use the principles of fingerspelling to fluently and accurately interpret fundamental biology content. For the Ball State the students, a fingerspelling test was used where they

fingerspelled the words from the lesson both prior to and after the study

During a post-session, members of the Lamar team interviewed participants about their experiences. The interviews were recorded. Responses were documented and analyzed.

## III. Participant Demographic

**Ball State University (N=10)**

| Ethnicity | Year in ASL Program | Sign Communication Level |
|---|---|---|
| African American/Black - **1** | Year One - **6** | Advanced - **1** |
| Latino/Hispanic - **1** | Year Two - **3** | Intermediate - **4** |
| White - **8** | Unknown - **1** | Survival - **2** |
| | | Novice - **3** |
| | | |

**University of Northern Colorado (N=15)**

| Ethnicity | Year in ASL Program | Sign Communication Level |
|---|---|---|
| African American/Black - **1** | Year One - **5** | Superior - **1** |
| White - **14** | Year Two - **1** | Advanced - **12** |
| | Year Three -**7** | Intermediate - **2** |
| | Year Four - **1** | |
| | Unknown - **1** | |

## IV. Results

**Change in Fingerspelling Skills**

**Ball State University, N=7**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | fingerspelling pre test | 7.71 | 7 | 7.566 | 2.860 |
| | fingerspelling post test | 23.00 | 7 | 16.248 | 6.141 |

**Paired Samples Correlations**

| | | N | Correlation | Significance One-Sided p | Significance Two-Sided p |
|---|---|---|---|---|---|
| Pair 1 | fingerspelling pre- & post-test | 7 | .847 | .008 | .016 |

**Paired Samples Test**

| | | Paired Differences | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t |
| Pair 1 | fingerspelling pre test - post test | -15.286 | 10.626 | 4.016 | -25.113 | -5.459 | -3.806 |

**Paired Samples Test Cont'd**

| | | | Significance | |
|---|---|---|---|---|
| | | df | One-Sided p | Two-Sided p |
| Pair 1 | fingerspelling pre test - post test | 6 | .004 | .009 |

**Paired Samples Effect Sizes**

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | Standardizer[a] | Point Estimate | Lower | Upper |
| Pair 1 | fingerspelling pre test - post test | Cohen's d | 10.626 | -1.439 | -2.499 | -.327 |
| | | Hedges' correction | 12.233 | -1.250 | -2.171 | -.284 |

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

## Change in Interpreting Ability

**University of Northern Colorado, N=14**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | interpreting pre test | 9.21 | 14 | 2.455 | .656 |
| | interpreting post test | 10.93 | 14 | 3.990 | 1.066 |

**Paired Samples Correlations**

| | | N | Correlation | Significance One-Sided p | Significance Two-Sided p |
|---|---|---|---|---|---|
| Pair 1 | interpreting pre test & post test | 14 | .386 | .086 | .172 |

**Paired Samples Test**

| | | Paired Differences | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t |
| Pair 1 | interpreting pre test - post test | -1.714 | 3.791 | 1.013 | .475 | -1.692 | -1.692 |

**Paired Samples Test Cont'd**

| | | | Significance | |
|---|---|---|---|---|
| | | df | One-Sided p | Two-Sided p |
| Pair 1 | interpreting pre test - post test | 13 | .057 | .114 |

**Paired Samples Effect Sizes**

| | | | | Point Estimate | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | Standardizer[a] | | Lower | Upper |
| Pair 1 | interpreting pre test - post test | Cohen's d | 3.791 | -.452 | -.996 | .107 |
| | | Hedges' correction | 4.029 | -.425 | -.937 | .101 |

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

## Students' Experiences

*Likes*

It let me learn science terms in a new and different way.
I loved the multimodal language options.
The categories of specific subjects are great.
There were many new words or ones I hadn't heard for a long time.

I liked to be able to read the English if I didn't understand the sign.
I could learn new signs.
I liked the signs
I found the tools useful.
I liked having the Avatar use non-manual markers to help me understand.
The tools were easy to use.
There were lots of terms for me to learn, rather than a limited number.
These are unique tools.
It helped me learn science terms.
I could find things easily.
It is a good way to learn new signs.
I liked the number of words available.
It was easy to understand.
It gave me the ability to look up signs.
The tools were friendly to use.
I found the experience beneficial.
The material was easily accessible.
It was easy to search.
As non-native signer it was interesting and helpful.
It helped my understanding of English.
I liked being able to learn on my own.
Well made.

*Dislikes*
The fingerspelling was difficult to understand.
Some signs conflict with those in other dictionaries.
I prefer the human in the SBL to the Avatar in the SBD.
I would have preferred a real person to an Avatar.
Some of the Avatars were hard to understand when fingerspelling.
I didn't like the Avatars.

**V. Key Findings**

Results were organized around three research questions: 1) How effective is use of a fingerspelling video that incorporates discussion and practice in combination with a signing dictionary and lexicon in increasing the fingerspelling skills of interpreting students? 2) How effective is use of a fingerspelling video that incorporates discussion and practice in combination with a signing dictionary and lexicon in increasing interpreting students' ability to interpret spoken material focusing on genetics and heredity fluently and accurately? 3) How do participants assess their learning experience?

Research Question 1 —The use of the dictionaries to learn new signs as well as mastering the examples presented in the new fingerspelling principles video were effective in increasing students' fingerspelling skills (mean pre use=7.71 and mean post use=23.00).

Research Question 2 — Comparison of the pre- and post-videos of students' interpretations showed a marginally significant increase in their ability to interpret the video. They were able to apply more of the morphs at the end of study resulting in participants having larger chunks of fluent interpretations than at the outset (mean pre use=9.21 and mean post-use=10.93).

Research Question 3 — Post-use participant responses revealed that the sequential explanations and practice activities provided in the video combined with individualized use of the SBD and SBL was a positive, unique, and personalized learning experience. They also revealed dislike of the Avatar signers incorporated into the SBD and a preference for the human signers used for the SBL.

**V. Implications**

There are arguments about who should teach ASL. Many believe that only deaf people should teach ASL as they have an emic perspective. However, there are not enough deaf people available to fill the positions. Regarding fingerspelling, it is frequently taught as a course. However, no curriculums are available to guide faculty in how to teach it. Therefore, they often use their own strategies. In situations where Children of Deaf Adults (CODA's) with native fluency in fingerspelling are doing the teaching, they may have native fluency in fingerspelling but not the linguistic knowledge of coarticulation. This research provides a format for teaching native fingerspelling that also includes a linguistic explanation.

Future research needs to increase the examples provided in the current video and include additional detailed step-by-step instructions for its use. An interesting finding when interviewing the faculty who led the study was that other faculty who saw the video they were using wanted to incorporate it in their own teaching. This is further confirmation that our research is helpful and can improve the teaching of ASL.