

Writing Outcomes and Expressive Language Use of Deaf High School Students

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Writing Outcomes and Expressive Language Use of Deaf High School Students**Abstract**

This study explores the writing performance of deaf high school students, focusing on narrative, argumentative, and argumentative-with-sources genres, and examining the role of expressive language proficiency and early language exposure. Using a descriptive research design, the writing samples of 75 students were scored for idea development, organization, style, sentence fluency, word choice, and conventions using automated scoring. Results revealed a range of low to mid performance, with the argumentative-with-sources writing scoring similarly to narrative writing and showing incremental growth across the grade levels. Early language exposure and proficiency in ASL or spoken English were linked to better writing outcomes, highlighting the importance of early and accessible language development. The results underscore the urgent need for linguistically responsive materials, reliable ASL assessments, and evidence-based instructional strategies for addressing the range of needs of deaf students. The study calls for further exploration of the patterns observed in students' writing to design instruction that builds on strengths and addresses needs, enhancing academic success and societal participation for deaf learners.

Writing Outcomes of Deaf High School Students and the Influence of Expressive Language

We are in an era where the rise of phones and the internet has connected individuals from around the world. Writing is used for communication in many aspects of life, from casual text conversations to intellectual debates through academic publishing. Writing genres are highly diverse, and texts are increasingly multimodal and multilingual as students capitalize on the many digital tools available to them (Dahlström, 2021; Sebba, 2012). Unlike the natural acquisition of language, persons must be taught how to write. This is premised on the understanding that advancement in writing skills is an ongoing, lifelong process that begins when a toddler first scribbles their ideas on paper. Throughout school years, writing instruction is provided to develop students' language and genre-based writing skills so that they can more effectively express themselves in various contexts and engage with the larger world.

For students who bring additional linguistic resources to the classroom, writing teachers must consider how they can effectively nurture students' writing skills while also prompting the development of students' expressive language skills (Velasco & García, 2014). Deaf students' linguistic repertoires often include languages and communication modalities different from those of their hearing peers (Cannon et al., 2016). These histories can result in complex writing identities and skill development, requiring knowledgeable mentorship and instruction specific to this learner group's social, cultural, and linguistic needs. Specialized instruction for deaf students must be data-driven, multi-faceted, and born from a deep understanding of student performance. After years of data analysis, researchers have begun to understand how to evaluate deaf students' writing skills in linguistically responsive ways (Dostal et al., 2021; Holcomb et al., 2023; Kilpatrick & Wolbers, 2020) and to support deaf education teachers in providing effective writing instruction in elementary and middle grades (Dostal et al., 2024; Wolbers et al., 2022;

Wolbers et al., 2016) that leads to gains in genre-based and language skills at the elementary and middle-grade levels (Wolbers, 2008; Wolbers et al., 2020; Wolbers et al., 2022; Wolbers et al., 2015). However, when looking into the current state of writing performance of high school deaf students, there is limited information in the literature (Wolbers, Dostal & Holcomb, 2023).

For students engaged in bilingual bimodal instruction, descriptive research studies highlight the positive relationship between early sign language exposure and written language skills. Gärdenfors (2023) analyzed narrative writing from Swedish DHH students aged 8–18 and found that greater proficiency in Swedish Sign Language correlated with student writing that included more complex sentence fluency and richer adjective use. In one of the only intervention-based studies with deaf secondary writers, Easterbrooks and Stoner (2006) investigated the impact of a visual tool and faded teacher support on the narrative writing of three deaf high school students using a single-case design. Their findings showed an increase in the use of adjectives; however, the students' inclusion of story grammar elements decreased. Geers and Hayes (2011) assessed the informational essay writing of 112 deaf high school students with cochlear implants (CIs), each self-reporting primary use of spoken language or a combination of sign language and speech. More than half of the deaf students scored below one standard deviation of their hearing peers across the four scored categories--organization, content, language use, and vocabulary. The scoring tool provided a total of 25 points per category; students' performance scored slightly higher on language use (14.8 points) and lower on organization (12.1 points).

Literature Review

Writing Genres

Writing instruction in the secondary grades is designed to prepare the students for high-stakes assessments, post-secondary ventures, and to write for everyday life purposes. A genre that receives intensive focus in the later grades is argumentation. One reason is that the structure and purpose of crafting an argument can be linguistically demanding (Ross et al., 2020). Another reason is that traits and features of other genres can be integrated within argumentative expressions. For example, a compelling argument may include elements of a narrative to engage the reader or include aspects of a compare-and-contrast essay to support a claim. Even though argumentation and hybrid genres are heavily focused on in secondary school, narrative writing is still widely taught among deaf students when expressive and written language are considerably delayed (Wolbers, Dostal & Holcomb, 2023), and the complex linguistic and writing skills of argumentation are arguably out of reach.

Narrative. Narratives are the most familiar genre for children, beginning as soon as they start to express language (McCabe & Bliss, 2003). With access to language, children naturally develop the propensity and skills to narrate past events, as is seen in research with hearing children (Miller et al., 1990; Miller & Sperry, 1988). Upon entering school, children are taught to elevate their oral language skill (Common Core Standards, 2010). They draw on their past experiences as a foundation for communicating events, stories, and ideas initially through oral language and then in writing (Dyson 1983, 2009). Due to this developmental progression, narratives receive significant attention in early childhood and elementary education (Crowhurst, 1987; Langer, 1985).

Crafting narratives involves retrieving a past event and constructing language according to genre-specific patterns (Greenhalgh & Strong, 2001) to develop coherent story structures (Stein, 1978). Research has demonstrated that formal instruction on producing narratives in oral

language can have a positive influence on students' ability to craft narratives in written language (Spencer & Petersen, 2018). Parallels in expressive language and writing outcomes are seen with deaf children (Dostal & Wolbers, 2014, 2016; Wolbers et al., 2024a); however, the language experiences of young deaf children are highly variable, leading to diverse and multifaceted trajectories for language and literacy development (Hernandez et al., 2023). Literature on this subject confirms that a solid foundation in ASL prepares deaf children well to understand syntactic structures (Hoffmeister et al., 2022) across languages and other cognitive and linguistic skills necessary for narrative expression, such as the relationship between the time of an utterance versus the time it is referencing (van Beijsterveldt & van hell, 2010). As students progress through school and their language skills mature, writing instruction shifts increasingly towards argumentation due to its greater relevance to participation in a democratic society.

Argumentation. Children as young as two years old engage in arguments with their parents, but at this stage, their primary approach tends to take on the stance of “my side is always right” (Ferratti & Graham, 2019). With maturity and exposure to various people with diverse perspectives, children begin to understand different viewpoints and articulate their positions with supporting evidence. Argumentative language plays an important and often hidden role in many formal and informal aspects of deaf students' lives. Like any student, they may informally protest an assignment grade, formally argue for a longer lunch hour, or respond to an essay prompt. At the same time, a necessary aspect of everyday engagement in mainstream society is self-advocacy (Nikolarazi; et al., 2019), which requires the student to consider a communication partner's alternate perspective while clearly and assertively communicating their needs (Jozwik & Cuenca-Carlino, 2020).

Before educators can expect students of any age to effectively self-advocate and engage in authentic purposes of argumentation, they must recognize that developing strong arguments requires complex, intertwined skills like language, cognition, theory of mind, pragmatics, and critical thinking (Felton & Kuhn, 2001). These skills can be facilitated through structured instruction and purposeful, meaningful interactions between peers and knowledgeable mentors. In high school, the attention to argumentation during writing instruction intensifies. This emphasis is strategically designed to prepare students for post-secondary education, to succeed in college courses, and to meet the demands of future professions (Common Core State Standards, 2010).

Features and Complexity of Argumentation

A closer look reveals that effective argumentation consists of multiple overlapping components. One important part of this intricate web is having a clear goal regarding the intended outcomes of the argument (Felton et al., 2015a, 2015b; Ferretti et al., 2009). Integral to this is the awareness of the audience; arguments must take the readers' frames of reference into consideration (Midgette et al., 2008). Moreover, effective argumentation requires a wealth of prior knowledge about the context that is being discussed. This is tied closely with working memory (McCutchen, 2000), which enables students to retrieve and integrate relevant ideas to support their claims argumentatively (Nussbaum, 2008; Nussbaum & Schraw, 2007). Students also need to visualize potential counter-arguments and evaluate their merits (Felton & Herko, 2004; Felton et al., 2015; Wolfe et al., 2009; Wolfe, 2012). Beyond the drafting phase, the process of revising and refining language to align with the structure and organization of the argumentative genre becomes important (Butler & Britt, 2011; Hayes, 1996). Developing and engaging with these interconnected skills is highly dependent on students' linguistic foundation,

and studies show that deaf students do not always progress in argumentative types of writing as they do narrative (Dostal et al., 2021; Wolbers et al., 2022, 2024b). Teachers must keep the diverse backgrounds of their student populations in mind when preparing for instruction.

Expressive Language and Writing Development in Deaf Students

Deaf students represent a low-incidence population with significant variations in their access to and exposure to language at home and in school. Although it is difficult to describe every variation, there are overarching similarities that allow for the categorization of four primary groups. The first group consists of deaf students who use signed language and are learning written English through visual means (Hoffmeister & Caldwell-Harris, 2014; Holcomb, 2023). Approaches such as fingerspelling, chaining (e.g., view picture + sign + fingerspell + read text), and making connections between sign language varieties (e.g., simultaneous expressions and sequential forms) provide bridges between signed and written languages (Humphries & MacDougall, 1999; Wolbers, Holcomb & Hamman-Ortiz, 2023). The second group includes deaf students who use spoken language and are building upon their oral language skills, connecting sounds to writing. The third group involves deaf students who use both signed and spoken language approaches to learn written English (McGovern, 2023). Under ideal conditions where they are unaffected by language deprivation, all three groups are capable of engaging with grade-level curricula (Wolbers et al., 2024b).

The fourth group is deaf students who are not fluent in their expressive language, signed or spoken, and encounter difficulties with writing. If a deaf child experiences language deprivation between 0-3 years old, their learning trajectory, including language and writing, can be affected over the long term. The impact of this deprivation can manifest in areas like executive functions, working memory, and cognition (Hall, 2017; Gultai, 2018), and these

difficulties can be seen in their expressive language and writing (Holcomb et al., 2023). Research shows that some teachers, particularly those without sign proficiency, may struggle with responsive language instruction, providing appropriate access to instruction, and addressing language deprivation when serving this population (Holcomb et al., 2024). Understanding these diverse language backgrounds is important and facilitative when evaluating deaf students' writing development in various genres. It is also helpful to consider how writing samples are typically evaluated in general education settings and how these scoring methods have been applied to deaf students' writing.

Evaluation of Student Writing

In secondary general education classrooms, various tools are used to evaluate student writing, including standardized and criterion-referenced rubrics. A few common standardized assessments include the ACT Writing Test, the NAEP Writing Assessment, and the Smarter Balanced Assessment (SBAC). The NAEP and SBAC focus on narrative, informative, and argumentative writing, while the ACT asks students to “write an essay in which you develop your own perspective on the issue” (2025, ACT Education Corp.), emphasizing argumentative writing. Regardless of genre, the rubrics of these assessments organize scoring criteria into two major domains: writing skills (e.g., idea development, coherence, organization) and language features (e.g., grammar, sentence fluency, conventions). The snapshot of skills that standardized assessment results provide is helpful for teachers, but criterion referenced assessments (e.g., 6+1 Trait Rubrics) can offer more flexibility in how scoring is focused and formative insights (Graham et al., 2015). Teachers of deaf students often adapt or modify standardized or criterion-referenced writing rubrics as there are limited resources developed for this population (Lee et al., 2024; Smith & Allman, 2020). Their adapted evaluation may take into account the

wide variance in students' language backgrounds, including bilingual development, and the grammatical structures commonly found in their writing. Analyzing a full class of student samples can require a substantial amount of time and effort; however, the emergence of AI-powered evaluation tools has the potential to support teachers by providing fast, automated scoring and freeing up time for individualized feedback and instructional planning (Evmenova et al., 2024).

This study takes a closer look at the writing of deaf high school students, overall and in relation to their language variables (e.g., age of exposure and language proficiency), at a time when argumentative writing typically receives greater emphasis.

Method

The purpose of this study is to investigate the current state of deaf high school students' writing by collecting, scoring, and analyzing narrative and argumentative writing samples. The study is intended to provide a big picture of deaf high school students' writing performance overall and in relation to their expressive language variables. We investigate the following research questions:

1. What are the central tendency and variability statistics for narrative and argumentative writing scores among deaf high school students?
2. Are there differences in writing performance based on language variables?

Design

A descriptive research design is ideal for examining the writing samples of deaf high school students because it allows for systematic observation, analysis, and description of specific characteristics of the students' writing without altering the natural writing environment.

Descriptive research is particularly valuable in learning about the writing patterns of secondary

deaf students as there is limited prior research on this topic. It can provide a snapshot of existing conditions, which can serve as a basis for further study (Creswell & Creswell, 2018). In this study, we are reporting the central tendency and variability of deaf high school students' writing, and examining the scored data for patterns of performance related to expressive language variables.

Sample Criteria and Recruitment Procedures

The criteria for this study required student participants to be either deaf or hard of hearing and enrolled in grades 9 through 12. After an online search, the research team compiled a list of 2,137 email addresses belonging to teachers and administrators of programs for deaf students. After removing 619 inactive addresses, we were left with 1,518 active addresses. These educators received an initial invitation to participate in a survey about secondary writing instructional practices (see Wolbers, Dostal & Holcomb, 2023). Of those who took the survey, 222 teachers identified themselves as secondary teachers of writing. These 222 teachers were invited to participate in the current study. Additional invitations were distributed through social media outlets and the listservs of professional organizations, such as the Association of College Educators - Deaf and Hard of Hearing and the Deaf Intersectionalities Special Interest group of the American Educational Research Association. A total of 21 teachers (with an average of 3-4 students each) responded to the invitation for this study.

We collected consent forms from teachers who responded to our invitation email and their administrators. Consent forms were sent to families or guardians through regular school-home correspondence, and students were asked if they would like to participate. To mitigate the risk of potential coercion, we asked that a school-based colleague introduce the study to the participating teachers' students in grades 9 through 12. Students were informed

about the study's purpose and details via a brief informational video in ASL and English produced by the research team, after which the students decided to provide their assent or not. Participating classes were offered a stipend, the amount of which was determined by the total number of writing samples received. This stipend could be used to purchase materials, such as books, to support the language arts classes.

Participants

Seventy-five secondary students participated in this study, with 18 in ninth grade, 27 in tenth grade, 21 in eleventh grade, and 9 in twelfth grade. The largest subgroup was 15-year-olds ($n=27$) born between September 2, 2007 and September 1, 2008, followed by 16-year-olds ($n=22$), 17-year-olds ($n=17$), 18-year-olds ($n=7$), and two 19-year-olds. The gender distribution was 3 gender diverse, 37 female, and 35 male. The racial/ethnic distribution was 33 Latine, 17 Black, 10 White, 6 multiethnic, 2 Asian, and 7 unknown. Fifty-eight students identified as deaf, 16 as hard of hearing, and 1 as deafblind. Twenty students had cochlear implants, 29 had hearing aids, and 26 did not have any listening assistives. Of the 49 students who had listening devices, 32 always used them, 7 students used them frequently, 5 students used them sometimes, 3 students used them occasionally, and 2 (one with a cochlear implant and one with a hearing aid) never used them. Approximately 13 had additional disabilities including ADHD ($n=3$), intellectual disability ($n=2$), health impairment ($n=2$), autism ($n=1$), usher syndrome ($n=2$), and developmental disability ($n=3$).

Language

Teachers rated students' language expressions in ASL and spoken English on a 5-point Likert scale (1 = "can express most anything in the language" to 5 = "does not express anything in the language"). Students' proficiency in ASL ($M = 1.71$, $SD = 0.99$) and English ($M = 2.83$,

SD = 1.57) are reported in Table 1. As a score of 1 equates to greater expressive proficiency, a larger number of students were rated as being able to “express most anything” in ASL than in spoken English. There were 16% of the students (N=12) who had highly rated expressive language skills (as rated by teachers) and were characterized as expressing most anything in both ASL and spoken English. An additional 23% of the students could express either most anything in ASL (N=13) or in spoken English (N=4) while expressing many things in the other language. There were 9% of the students (n=7) who expressed many things in both languages. An additional 43% of students were characterized as having dominance in either ASL or spoken English. Of these, 27 students expressed many things (N=11) to most anything (N=16) in ASL while not using spoken English or expressing it poorly. Conversely, 5 students expressed many things (N=3) to most anything (N=2) in spoken English while not using ASL or expressing it poorly. Finally, 9% (N=7) were rated as having minimal expression in either language.

<<Table 1 Here>>

Twenty-seven students were exposed to ASL before the age of 3, while 33 students received exposure between the ages of 4 and 7 years. Five students were exposed to ASL between the ages of 14 and 20 years, and three students were not exposed to ASL at all. Age of ASL exposure data from seven students are unknown. The primary language used at home for communication between family members and the deaf student varied, with 48 families using spoken languages, 18 families using both or a combination of signed and spoken languages, and 9 families using signed language. The languages spoken in the home in order of prevalence included English (n=50), Spanish (n=41), Hmong (n=2), Urdu (n=2), Arabic (n=2), French (n=1), Somali (n=1), Vietnamese (n=1).

Educational Context

Students were enrolled in various educational settings, including deaf schools (n=36), self-contained classrooms in public schools (n=25), and public school mainstreaming (n=14). The majority of these programs operated with an ASL/English bilingual philosophy where the language of instruction was ASL and English (visual forms and/or spoken). Total Communication was the next most prevalent communication philosophy where there was use of spoken English with sign support. See Table 2 for additional information. Few students had been educated in these programs since the critical period for language acquisition, making it challenging to disaggregate writing outcomes by setting or philosophy. Sixteen students had been enrolled in their current program or district since early childhood, 19 since elementary school, 22 since middle school, and 18 since high school.

<<Table 2 Here>>

Data Collection

We selected three writing prompts--one narrative and two argumentative--from a set of pre-generated prompts on the Measurement Incorporated (MI) Write platform. MI Write is a versatile, web-based learning platform equipped with an automated essay scoring feature. The writing prompts were administered to participating secondary students during the fall semester (September-November) outside of instructional time (e.g., during study hall, free time).

Writing Prompts

The narrative prompt invited students to compose a personal account of an experience, such as visiting a distinct location or trying a new activity. The first argumentative prompt requested that students identify their hero and explain why this person meets the criteria for being a hero. The second argumentative prompt, which was administered to students with a reading level of third grade or above, invited students to use source material written at a third

grade reading level to compose an essay to their state legislators arguing for or against the raising of the minimum age for drivers. Teachers were asked not to administer the second argumentative prompt to students reading below a third-grade level, based on their school's assessments. Students were given 30 minutes to complete the narrative prompt and argumentative prompt without source material and 45 minutes to complete the argumentative prompt with source materials.

The prompts were provided to students in print and spoken English and/or ASL, depending on the languages used by the students. Students were encouraged to ask questions about the prompts to ensure that they understood the task. While many students completed all three samples, there were far fewer argumentative samples returned. There were 62 narrative samples, 57 argumentative samples without source material, and 49 argumentative samples with source material. Common reasons for why a prompt was not administered or why a student did not respond to a prompt included the student's reading level being below third grade, the student not understanding the prompt, the student struggling to write complete sentences, or the limitation of time.

The students were asked to respond to the prompts either by handwriting or by typing their response in the MI Write online system. The teachers provided the following instructions to the students: "Choose to type or handwrite your response using the approach through which you feel you can document your ideas more fully." Students who chose to handwrite their responses had their essays submitted to us through their teachers. We transcribed their essays into MI Write for automatic scoring. We received 8 handwritten narrative samples, 4 handwritten argumentative samples without source material, and 13 handwritten argumentative samples with source material.

Data Scoring

The scoring process in MI Write is based on automated models that assess writing traits by genre within the grade bands of 9th/10th and 11th/12th grade. MI Write's automated scoring system has been refined over the past 50 years through extensive calibration and comparison to human scoring (Chen et al., 2022; Shermis et al., 2002; Wilson & Rodrigues, 2020). Each writing sample received six trait scores, one for each of the following: idea development, organization, style, sentence fluency, word choice, and conventions. These six traits are each scored on a 1 (low) to 5 (high) scale. Each essay is also assigned an overall score (30 possible points), which reflects the cumulative assessment of these traits. On MI Write's 1-5 scale, a score of 3 aligns with external grade-level quality indicators, such as the Common Core State Standards, which designate the features of a "3" as generally meeting expectations.

Each trait score is accompanied by 3-6 descriptors that define performance at each score level. For example, a score of 1 for organization of an argumentative piece reflects a response that is severely disorganized. The response may lack sufficient content to establish structure, and transitions often lead to confusion. Additionally, the progression of ideas from introduction to conclusion in a sample with a score of 1 is disrupted by issues like repetition, gaps, or unrelated content. A score of 3 for organization in an argumentative essay indicates that *"The response has a basic vertical and horizontal structure."* The descriptors for this score indicate that transitions are present, though they may come across as forced and may somewhat hinder the smooth flow of ideas; and although there is a noticeable progression of ideas from the introduction to the conclusion, the cohesion between sentences might be inconsistent. A score of 5 for an argumentative sample reflects a well-organized response with a clear structure suited to its purpose and audience. The writing flows smoothly from a purposeful introduction to a strong

conclusion, with effective transitions that enhance unity and support a cohesive progression of ideas.

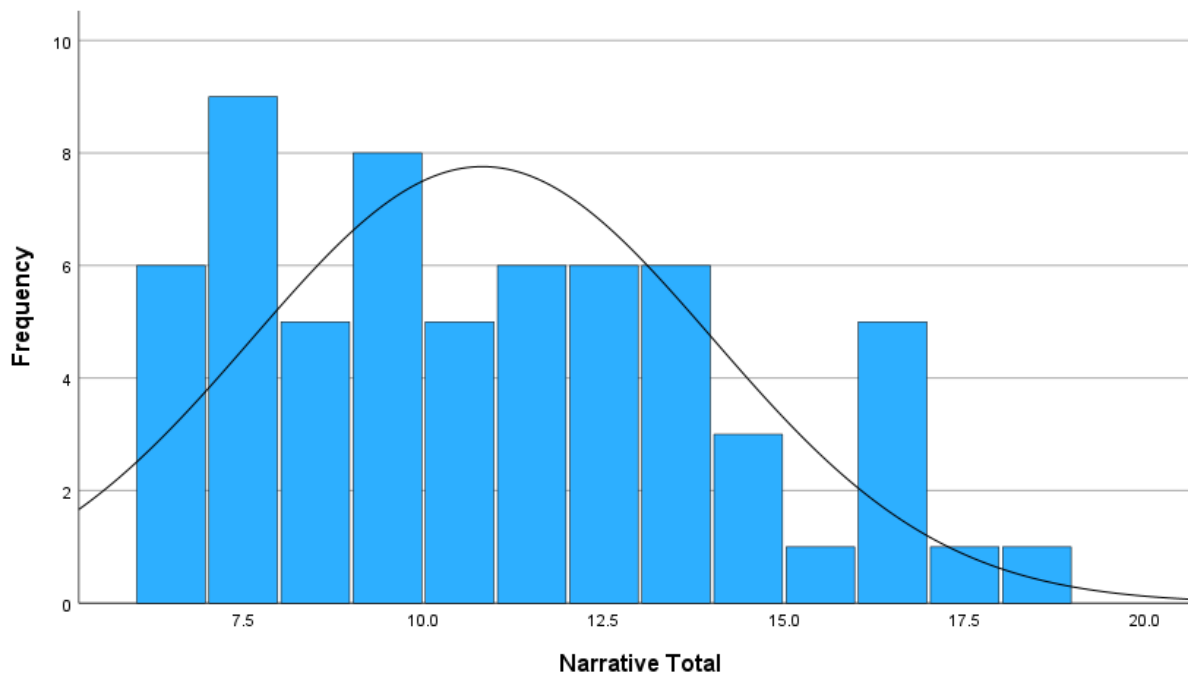
Data Analysis

To address the first research questions, we reported measures of central tendency (i.e., mean) and variability (i.e., standard deviation, minimum, and maximum scores, and frequency distributions) for each of the six traits and the total score by genre. To answer the second research question, we disaggregated data by age of ASL exposure and ASL and English expressive language skill. In cases where sufficient data were available, independent samples t-tests or analysis of variance were applied to identify statistically significant differences between groups.

Results

We present the findings by research question. Our first research question asks: What are measures of central tendency and variability in deaf high school students' narrative and argumentative writing? The trait scores are provided by genre in Tables 3-6 followed by Figures 1-3 showing the frequency distributions of the total scores. Across genres, the trait scores generally range from 1 to 3 with language variables such as word choice and sentence fluency and conventions scoring slightly higher in range and mean than other traits such as ideas and organization. The scores for narrative and argumentative-with-sources are similar for individual traits and total means while the argumentative writing is slightly lower. The distributions in Figure 1-3 show narrative writing to have a more balanced spread of data while the argumentative scores are highly concentrated to the left among the low scores resulting in positively skewed distributions.

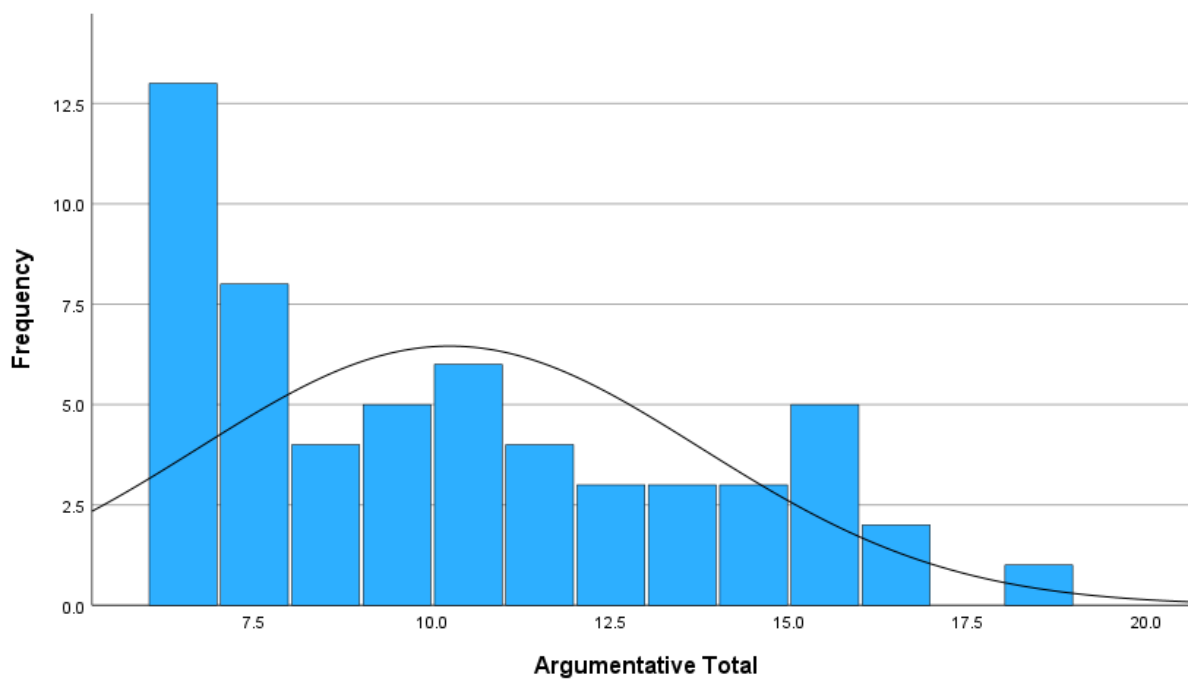
<<Table 3 Here>>

Figure 1*Distribution of Narrative Scores*

Note: To demonstrate the variation in student performance, the x-axis shows only the range of scores observed. The MI Write rubric spans scores 1 through 30.

<<Table 4 Here>>

Figure 2*Distribution of Argumentative Scores*

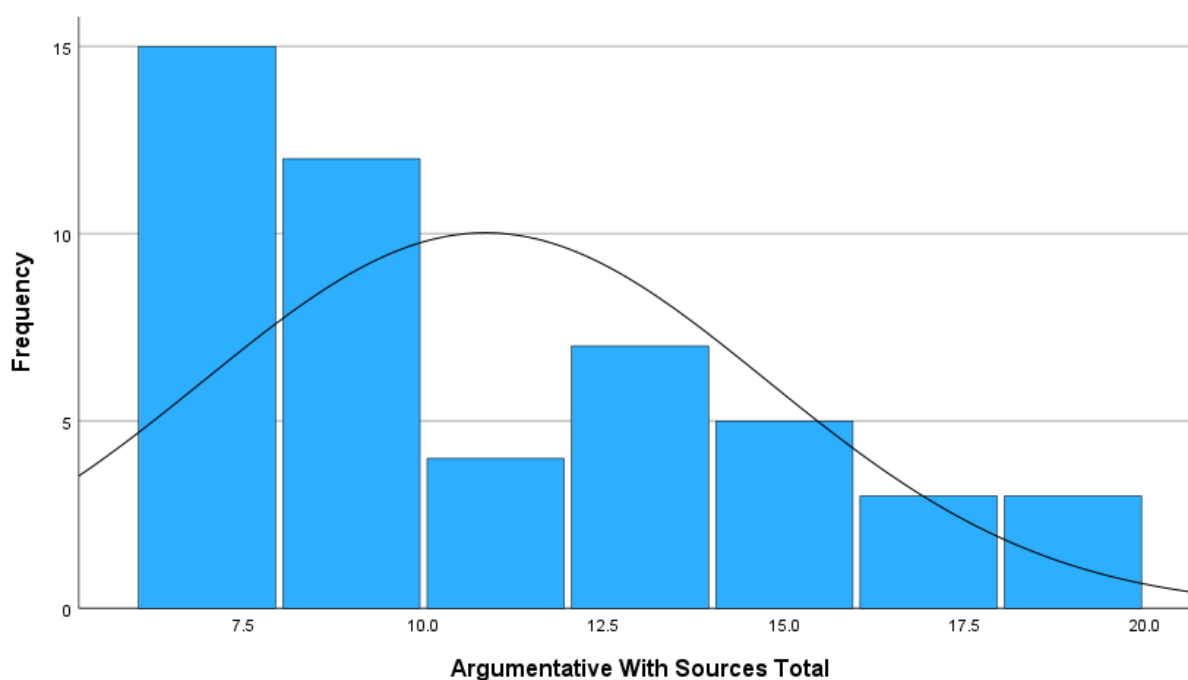


Note: To demonstrate the variation in student performance, the x-axis shows only the range of scores observed. The MI Write rubric spans scores 1 through 30.

<<Table 5 Here>>

Figure 3

Distribution of Argumentative-with-Sources Scores



Note: To demonstrate the variation in student performance, the x-axis shows only the range of scores observed. The MI Write rubric spans scores 1 through 30.

Because these findings were different from what we know from previous research--specifically that deaf students tend to score higher on narrative writing compared to argumentative writing--we added a post analysis of 35 students who submitted samples for all three prompts. This analysis was completed to rule out that the findings were due to different subsets of students responding to each genre prompt. In Table 6, the findings demonstrate that while there was less spread in the narrative score totals compared to argumentation with sources, the mean totals were similar. The mean for argumentation was lower, showing the same patterns as in the full sample. The differences by genre did not show statistical significance in a repeated measures ANOVA analysis, $F(2, 68) = 1.24, p = 0.3$.

<<Table 6 Here>>

Furthermore, higher mean scores could be observed among 11th and 12th grade students for argumentation with and without sources as compared to 9th and 10th grade scores. This may

allude to continued instruction and growth in this type of writing throughout the high school years. See Table 7 for total scores by grade band and genre.

<<Table 7 Here>>

However, independent samples t-tests comparing the performance of the 9th-10th grade band to the 11th-12th grade band were not statistically significantly different for narrative, $t(59.85) = -0.12$, $p = 0.9$; argumentation, $t(55) = -0.97$, $p = 0.34$; or sources, $t(27.85) = -1.28$, $p = 0.21$.

The second research question asks: Are there differences in writing performance based on language variables? Total writing scores disaggregated by age of ASL exposure, ASL skills, and spoken English skills are presented in Tables 8-10. Min/max, means, and standard deviations for cells with more than five participants are reported, and t-tests or analysis of variance were applied to cells with more than 10 participants. Means for the total writing score are slightly higher for those who were exposed to ASL between birth to three years in comparison to those exposed between four to seven years, with the greatest difference seen on the Argumentation with Sources writing task. See Table 8. When comparing the groups using independent samples t-tests, no statistically significant differences were found in the narrative genre, $t(49) = 1.08$, $p = .46$, argumentative genre, $t(43) = 1.00$, $p = .16$, or argumentative with source genre, $t(37) = 1.10$, $p = .14$, by age of exposure.

<<Table 8>>

When data were disaggregated by ASL Skill, the highest ranges and means were consistently associated with the groups who were rated as being able to *express most anything* in ASL. This was true across the genres of writing. As students' ASL skill declined to *expresses many things* and then *difficulty expressing many things*, the total writing means across genres also declined. See Table 9. Sufficient numbers existed in the top two rating categories to

statistically compare them using independent samples t-tests. No statistically significant differences were found in the narrative genre, $t(51) = 0.54, p = .59$, or the argumentative genre, $t(42) = 1.07, p = .29$. For the argumentative-with-sources genre, Levene's test for equality of variances was significant, $F = 2.04, p = .01$, and degrees of freedom were adjusted. Those who expressed most anything in ASL were statistically significantly higher in their writing scores for this genre compared to those who expressed many things in ASL, and there was a moderately large effect size, $t(38.2) = 2.39, p = .02, d = 0.67$.

<<Table 9 Here>>

Similar patterns exist when examining the students' writing scores by spoken English skills. The highest mean scores across genres are associated with those who can *express most anything* in spoken English. Writing scores declined as spoken English skill declined to *expresses many things* and then *difficulty expressing many things*. See Table 10. Sufficient numbers existed in the top two rating categories to statistically compare them using independent samples t-tests. Again, no statistically significant differences were found in the narrative genre, $t(35) = 1.49, p = .15$, or the argumentative genre, $t(32) = 1.78, p = .09$. For the argumentative-with-sources genre, those who expressed most anything in spoken English were statistically significantly higher in their writing scores compared to those who expressed many things in spoken English, and there was a very large effect size, $t(28) = 3.82, p < .001, d = 1.42$.

<<Table 10 Here>>

Samples of argumentation with sources writing are in the Appendix. These are organized by the students' ASL and spoken English language skills to demonstrate the difference in writing quality between those rated as expressing *most anything* with those expressing *many things* in the

languages. Each sample is accompanied by the student's demographic data and their automated score.

Discussion

The writing instruction that deaf students receive varies widely, from a focus on argumentation to prepare them for academic discourse to functional or narrative writing (Wolbers, Dostal & Holcomb, 2023; Wolbers et al., 2024b). To better design writing instruction that meets these students' diverse needs, it is essential to examine the current state of writing among deaf secondary students. This study analyzed narrative and argumentative writing responses from 75 deaf high school students to provide insights into performance by genre and language variables.

Data were reported by total and trait scores (i.e., the development of ideas, organization, style, word choice, sentence fluency, and conventions), which were generated automatically by the MI Write system. Interpretations of the data, then, must be contextualized within a broader understanding of the development and limitations of automated scoring systems. Most research on automated writing evaluation systems is based on writing samples from monolingual English speakers, often within large-scale assessments (Powers et al., 2000; Wang & Brown, 2007), while few studies have examined norms for multilinguals who use English (Choi & Lee, 2010). No prior studies have analyzed the applications of automated scoring to the population of deaf students. As a result, these systems may be standardized around linguistic patterns typical of monolinguals rather than bilingual or multilingual writers. Although teachers of English as a second language in general education recognize that automated scoring systems effectively detect mechanical and grammatical errors, they find these tools overly rigid in assessing organization, style, and voice (Jiang et al., 2020; Li et al., 2015). More studies targeting bilingual

and multilingual writers across populations are needed to ensure that findings generalize across different linguistic backgrounds and writing contexts rather than reinforcing monolingual norms that diverge from deaf experiences (Holcomb et al., 2024). With that said, MI Write was used in this study to assess the writing of deaf students, a population with linguistic experiences and educational circumstances different from hearing monolingual or bilingual writers (Holcomb, 2023; Holcomb et al., 2023). In our discussion of results, rather than relying on comparisons to monolingual norms, we describe the variations found within the deaf population and explore their implications.

Mean data disaggregated by 9-10 and 11-12 grade bands in this study showed students in the higher grades performing at higher levels in argumentative writing skills, which was not a pattern observed in narrative writing. This may indicate that deaf students are receiving focused instruction on argumentative writing reflective of secondary writing instruction in general, which prioritizes persuasive writing or critical analyses of texts seen to prepare students for high-stakes tests (Applebee & Langer, 2011; 2015). However, the differences by grade band were not statistically significant, potentially indicating slower than desired growth as students progress through high school. This suggests a need for a specialized and responsive curriculum that can stimulate maximum growth in writing and language. .

Secondary writing teachers of deaf students report that ASL/English bilingual strategies and materials benefit their students; however, research and development are sorely lagging, and these resources are largely not available to them (Wolbers, Dostal & Holcomb, 2023). In the absence of evidence-based programs or curricula for the population, deaf education teachers develop and experiment with various materials which can slow students' progress if their attempts prove ineffective (Hartman et al., 2023). Slow growth in students' writing may be

reflective of the challenges facing teachers in planning for wide variability in the instructional needs of secondary deaf students--from developing and providing a functional writing curriculum for students experiencing the ongoing impacts of early language deprivation to adapting and teaching the grade-level curriculum for multilingual writers (Holcomb et al., 2024; Wolbers, Dostal & Holcomb, 2023). Teachers grapple with this by allocating more independent writing time to grade-level students while providing extensive writing instruction and support to students greatly challenged by writing due to the impacts of language deprivation (Wolbers et al., 2024b). Highly diverse classrooms of deaf students can be accommodated through differentiated instruction (Knoors, 2016). However, deaf pedagogy (Potier & Givens, 2023; Weber & Skyer, 2022) - approaches that center visual learning strategies, Deaf epistemology, and bilingual methods--remain less prevalent in literacy instruction than audiocentric approaches, which emphasize spoken language and listening-based interventions (Holcomb et al., 2023; Lederberg et al., 2013). As a result, teachers face considerable demands in developing, implementing, and assessing instructional materials that effectively support each student's language and literacy needs.

Another finding of this study was that students' mean scores were similar for the narrative and the argumentation-with-sources genres. These data demonstrate an interesting pattern, which differs from prior research showing that students' narrative writing outperforms argumentation (McCabe & Bliss, 2003). Narratives, typically introduced early in writing instruction, leverage familiar experiences and simpler structures, making them more accessible (Dyson, 1983; Stein, 1978). Conversely, argumentative writing requires advanced reasoning, the integration of evidence, and audience awareness—skills emphasized in secondary education to prepare students for post-secondary and civic engagement (Ross et al., 2020; Felton & Kuhn,

2001). These demands may be challenging for some deaf students who struggle with the effects of language deprivation (Wolbers et al., 2024b). The comparable scores across narrative and argumentative-with-sources writing in this study may reflect the age of the student writers and the characteristics of the prompts. Prior Strategic and Interactive Writing Instruction research found narrative scores to generally exceed argumentative scores (Wolbers et al., 2022, 2024a); however, those studies focused on younger, upper elementary students with naturally lower reading levels and fewer experiences to connect complex ideas in argumentative essays as compared with secondary students. Additionally in this study, one argumentation task incorporated source material at a third grade reading level which increased the task difficulty but also provided scaffolding for generating critical ideas, retrieving vocabulary, and spelling words (Hebert, 2019).

ASL or Spoken English Expressive Language and Writing Outcomes

Our finding shows that students with the highest fluency in any language, whether English or ASL, demonstrated the strongest writing performance. Students exposed to ASL before age three demonstrated slightly higher mean scores for total writing compared to those exposed between ages four and seven, particularly in argumentative writing with sources. Although these differences were not statistically significant, the pattern suggests that early language access plays a role in developing the skills needed for complex writing tasks. Further analysis revealed that as ASL proficiency declined, total writing scores across genres also declined. Specifically, students rated as being able to express "most things" in ASL scored statistically significantly higher in the argumentative writing with sources task than those rated as being able to express "many things" in ASL. A similar pattern emerged for spoken English proficiency: Students who could express "most things" in spoken English also scored

significantly higher in argumentative writing with sources. These findings are aligned with previous research demonstrating that students' expressive language and writing outcomes are highly intertwined. When instruction intentionally scaffolds complex expression in both the students' expressive language and their writing, gains are simultaneously detected in both (Dostal & Wolbers, 2014, 2016; Wolbers et al., 2024a).

The findings of this study demonstrate that students with stronger language foundations are better able to leverage their linguistic resources to respond to demanding writing tasks, whereas those who struggle to express themselves in ASL or spoken language often face extreme challenges with writing. Among the full sample, 39% (n=29) of students were rated by their teachers as having lower-than-expected expressive language skills, meaning they did not express "most things" in either ASL or spoken English. This lack of language proficiency contributed to challenges in responding to more linguistically complex writing prompts, such as argumentative writing with sources, which included lower participation rates compared to narrative tasks. A substantial portion of the samples received the lowest possible score of an average of 1 across the traits on narrative (n=18; 29%), argumentative (n=22; 37%), and argumentative-with-sources (n=18; 37%) writing tasks. This indicates the students' writing was either insufficient to evaluate, or that the ideas were minimal or confusing and that sentences were simple, error-ridden, and containing basic vocabulary. These language characterizations stand in contrast to what we know about children who have been exposed to accessible early language in ASL or spoken language and develop complex sentence constructions in their expressions by the age of four (Simms et al., 2013; Visser-Bochane et al., 2020) and start writing complete sentences by the age of seven (Holcomb, 2023).

Challenges Related to Language Proficiency and Writing Performance

Deaf schools that follow an ASL/English bilingual approach offer immersion in accessible language, yet significant variation exists in students' age-of-entry, with many transferring after the age of six, often due to unsuccessful mainstream placements (Henner et al., 2015). Age-of-entry to Deaf schools is often coupled with a student's initial exposure to ASL, and it comes as no surprise that later entry results in poorer linguistic performance (Henner et al., 2016; Finton et al., 2024). The outcomes of this study highlight the relationship between language skills and writing outcomes that cannot be reliably disaggregated by school setting or communication philosophy due to variability in age-of-entry. There are implications of widely existing heterogeneity in schools and classrooms that pose significant challenges for teachers to meet the language and writing needs of all students.

Significant variation in the language proficiency of deaf students which undergirds writing outcomes highlights a need for reliable assessments that can evaluate students' expressive language strengths and needs. Although six assessments exist to measure ASL proficiency, most are not designed for high school-aged deaf students. For example, the ASL-Receptive Skills (Enns et al, 2013; Allen & Enns, 2013) and ASL-Expressive Skills Tests (Enns et al., 2019) focus on younger children, with the former norms based on 203 children and the latter on 215 children ages 3–13. Additionally, the ASL-Expressive Skills Test relies on selective samples that only include children with early ASL exposure (before age 3). The Visual Sign Language Communication Checklist (Allen & Morere, 2022), aimed at children ages 0–5, is based on input from teachers and parents and was normed on 351 young deaf children. The ASL Comprehension Test (Hauser et al., 2016) and the Fingerspelling and Numbers Comprehension Test (Occhino et al., 2024) were tested on samples of 80 and 79 adult participants, respectively, limiting their applicability to high school students. While the ASL-Assessment Instrument

(Hoffmeister et al., 2013) was developed for school-aged deaf children, it lacks age-specific norms and, in its current form, is time-intensive, making it less feasible for routine administration.

Not to mention, existing ASL assessments do not evaluate the complexity of argumentation within signed discourse. For example, if students were to construct an argument on a topic such as the appropriate legal driving age (e.g., 16 vs. 18), no measures currently exist to assess key components of argumentation in ASL, such as persuasion, cohesion, and rhetorical structure. The influence of expressive language on deaf students' writing cannot be overlooked (Zhang et al., 2024), and the researching or teaching of writing must happen with understanding and consideration for students' expressive language needs. To do this effectively, further development in ASL assessment at the secondary level is needed.

Limitations and Future Directions

This study provides a descriptive overview of deaf high school students' writing, highlighting patterns in narrative and argumentative writing. However, as a descriptive study, it does not establish cause-and-effect relationships. The observed relationships between language variables and writing outcomes serve as a foundation for understanding trends within this population, yet further research is required to determine the specific mechanisms that influence these outcomes. Future research should consider a longitudinal approach, which could provide deeper insight into how early language exposure impacts the development of writing skills over time. By tracking language and writing development from early childhood through adolescence, researchers could identify critical periods and factors that influence the progression of writing abilities among deaf students.

Additionally, an in-depth analysis of the patterns observed in the writing samples could offer valuable information about the types of strengths and needs students demonstrate in written language and across different genres. While MI Write and other automated scoring programs offer promising evaluation tools for teachers, these systems may not be standardized to the writing of bilingual or multilingual students. There is a need for a range of linguistically responsive and evidence-based curricula, assessments, and instructional resources to meet the wide-ranging needs of secondary deaf students, from functional writing to argumentative writing skills needed for college and vocational success. Research could examine how specific instructional practices influence the writing outcomes of students with diverse language backgrounds, offering insights that could inform tailored curriculum. Specialized professional development for deaf education teachers translating such research to classroom practice is also needed. These efforts may provide information to support students' academic growth and the development of essential skills for civic and social engagement.

Another boundary of this study concerns teacher ratings of students' ASL and English proficiencies. We did not document raters' ASL fluency, training in multilingual assessment, or interrater reliability. Although these ratings provide valuable descriptive insight, future work could include brief documentation of rater backgrounds and calibration or reliability checks to strengthen confidence in the measurement of language proficiency.

Finally, this study's findings are limited by the sample size and its composition, which focused on a review of writing samples from a subset of deaf secondary students. While this approach provided insight into general trends, it may not fully capture the variability present within the broader population of deaf high school students. Expanding future research to include larger and more diverse samples, as well as the collection of multiple writing samples over time,

could enhance the generalizability of findings and provide a more comprehensive understanding of the factors influencing writing outcomes. These limitations highlight the importance of continued investigation to build on the foundational insights provided by this study.

Conclusion

This study highlights significant variability in the writing performance of deaf high school students across narrative and argumentative genres and related to language factors such as early language exposure and proficiency in ASL or spoken English. While students show some progress in argumentative writing across the grade bands, writing growth appears to be slow and points to the need for specialized, linguistically responsive curricula and improved ASL assessments. Addressing these gaps requires evidence-based instructional practices that accommodate the diverse language backgrounds of deaf students. Future research should explore the patterns observed in students' writing to develop strategies that enhance their strengths and address needs, enabling these students to achieve academic success and actively engage in society.

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Appendix

Argumentative-with-Sources Writing Samples

Student 1

Student 1, a white male in 11th grade, excels in language skills, receiving the highest ratings for his ability to express almost anything in both ASL and spoken English. He has attended a residential or day school for the deaf since early childhood, where an ASL/English bilingual communication philosophy is emphasized. Having acquired ASL between birth and age three, he grew up in a household where both ASL and English are used. He receives writing instruction through ASL and visual forms of English. He identifies as hard of hearing and never uses amplification. His essay scored 19 points.

I believe that the legal driving age should stay at 16. Driving gives teens a sense of freedom. I also think that just because the legal age is 16 doesn't mean that everyone who is 16 has to drive, they can decide if they want to wait, but giving teens the option would help teens not feel trapped. It would also help their parents a lot. As a driver myself my parents often ask me to pick up my siblings, or go to the store, or even driving to school. These are the reasons I think the driving age should stay at 16.

Driving gives people a sense of freedom. When people can't go anywhere on their own they feel trapped. With driving abilities teens have self-reliability, they don't have to have someone drive them to school, or practice or their friends house. This prepares teens for the real world as adults. People won't always have someone who can be their personal chauffeur. Giving teens the extra two years of experience before they become adults would help with their freedom and not relying on other people to do everything for them.

Just because they can drive doesn't mean they have to! Teens might not feel ready to drive and that is completely fine, but this doesn't mean we should take away the option for the teens that are ready. A 16 year old could feel overwhelmed with the idea of driving but another could be excited to finally go out by themselves. Many may argue that teenager's brains aren't fully developed but I believe anyone can keep learning new things well into adulthood. Some teens might not be ready but just because one teen isn't ready doesn't mean we should take away the option.

Many teens also have the need to drive. Their parents might not always be available to drive them somewhere. With the ability to drive teens can drive themselves to school and drive home from practice. This takes a load off the parent's shoulders and allows the teen to be more independent. Parents can also ask their child to do errands for them. For example stopping by the store for milk on the way home, picking up the other children from their activities such as school or sports. This proves that many teens have a need to drive, not just a want.

So in conclusion teen drivers should remain in place and the legal driving age should not be raised to 18. Driving gives teens a sense of freedom. Just giving them the option gives them the

responsibility without overwhelming them. Teens might also need to drive, to help out their parents. These reasons and many more are why I think that the driving age should stay at 16.

Student 2

Student 2, a white, non-binary 11th grader, excels in ASL, receiving the highest rating for their ability to express nearly anything in the language, though they do not use spoken English. Enrolled since early childhood in a residential or day school for the deaf with an ASL/English bilingual philosophy, they receive writing instruction provided through ASL and visual forms of English. Having acquired ASL between birth and age three, they come from a home where ASL is the primary language. They identify as deaf with ADHD and never use amplification. Their essay scored 15.5.

Should we raise the age for drivers from 16 to 18?

I think that the age should stay the same at 16.

Teenagers can take permits at fifteen and a half and for those six months of driving, they require a person of 21 years of age and have a driver's license to sit next to the permitted driver. I don't think it is about the age itself. New drivers at eighteen and new drivers at sixteen are the same. It is about experience, knowledge, and rationality. Good choices, behavior, and cautious driving are what make a driver good, not the age itself. A lot of teenagers need to go out to get their simulations going. They need to know and experience real life like jobs, school, friendship, and most importantly, driving. How can they do that if the age of drivers is raised? The parents may not be able to take them everywhere, they have a life to focus on. Even if they were able to drive teenagers to places, by the time they are eighteen they will be lost. Teenagers will be able to drive themselves to places if the driving age is 16. Men of all ages are 77 percent more likely to kill someone while driving than women. So maybe it is about gender, not age. However, I think it is about experience, mindset, good sense of choices, and common sense for driving, not age itself. Teenagers need to feel the euphoria of driving. Most teens have mental disorders like attention deficit hyperactivity disorder, depression, and anxiety. Driving helps them calm down. Teenagers can also learn budget planning because nowadays gas is expensive. If the age of driving is 18 then they maybe not have a job already and are new to everything. They may not be able to go to college because they don't know how to get themselves there. So, overall the point is that the driving age should not be raised from 16 to 18.

Student 3

Student 3, a Black female in 9th grade, excels in spoken English, earning the highest rating for her ability to express nearly anything in the language. She does not know or use sign language and is fully mainstreamed in a public school, where she receives writing instruction through spoken English. English is also the primary language spoken at home. Identifying as hard of hearing, she frequently uses her hearing aids. Her essay was scored at 12.4.

What do you feel is the appropriate age for driving? Me personally I believe it is sixteen. I say sixteen because of the fact you are 2 years away from adult hood. why wait untill you get to adult hood to drive? Sixteen is the best age for driving because that's when you learn best and learn from mistakes. Eightteen isn't really the best age to be learning to drive because of the fact that you may have just finished highscool and is ready to go to college. You would want to drive yourself to college, right? I honestly wouldn't want anybody to drive me to college, I want to do it on my own. It's apart of the experience. Plus finishing highscool, then moving on to college, you wouldn't really have any time to learn how to drive. It's too much going on at the time.

Sixteen is also the appropriate age for driving because you can drive yourself to work instead of asking your mom or taking public transportation. I'm just saying that when I turn sixteen I will be driving because I refuse to wait to I'm eightteen I doesn't make any sense to me to wait that long to learn to drive. Plus, im very impatient and stubborn so there is no way I will be waiting untill I'm eightteen to learn to drive. It's just pointless. When you turn eightteen that is the time for you to be getting ready for college and moving out of your parent's house. You would have too much on your plate to even be thinking about learning to drive. That is why I feel the appropriate age for driving is sixteen. I rest my case.

Student 4

Student 4, a Latino boy in the 12th grade, was rated as expressing many things in ASL while having difficulty expressing many things in spoken English. He receives writing instruction in a self-contained classroom within a public school that follows a Total Communication philosophy, combining ASL with spoken English support. Enrolled in the school since 9th grade, it is unclear when he began learning ASL. He identifies as deaf and frequently uses his cochlear implants. At home, both English and Spanish are spoken. His essay received a score of 9.9.

I think it is 18 oly year, because it very safety to reason important learned driving practice must be with parents would be show you how learned to driving test. 18 age should be safety, because adults, teen easy for self understand show where are going somewhere But I don't think not good idea 16 age. Because it very unsafe should not drive test and too young that should don't start learned driving test that would be problem with this. Someone accident crash from you then would get serious bring to hospital or able killed too. Important pay attention. "Not being able to do different things at the same time causes crashes too." Anyone 16 age it not good idea, should be wait until 18 age then can start learned a driving practice. Because that one is very important and make sure you are safe and would pass driving test.

18 age should don't get any buy drunk in car don't not good idea. Because it would be crash, killed to people get injured that would get trouble, police would take you in the jail.

This is very serious and important wait to 18 age then start driving practice would pass test and good luck.

Student 5

Student 5, an Asian American male in the 9th grade, was rated as expressing many things in spoken English while having difficulty expressing in ASL. He receives writing instruction in a self-contained classroom within a public school that follows a Total Communication philosophy which is implemented through the use of simultaneous ASL and spoken English. Enrolled in the school since middle school, it is unclear when he began learning ASL. He identifies as deaf and always wears hearing aids. English and Urdu are spoken in the home. His essay received a score of 9.5.

I perfore age 16 because it is more easier to practice driving. Should 16-year2-olds drives when Rajn is 16 years old he got his driver license. And he feel that he thinks it is more better to drive when I am 16 years old. But Rajn can't drive alone, he has to drive with his parents not alone. Some people were age 16 and 15 sooo teenager die every year. That why the parents have to be with Rajn so Rajn doesn't get some car crash and die easily.) Should the driving age be raised to 18? = Thousand of people being asking what could be done to stop this from happening again. Between 1,995 and 2,004, there were 30,917 deaths as of 15-17 years old from car crashes. About 11,00 were drivers. The rest were people who were walking, passangers, and people in cars that were hit. Studies that not enough experience cause accident car crash. But some people were age 18 they didn't got on accidentaly car crash. So some people needs a manager to help learning how to imerove driving the car.

Tables

Table 1

Ratings of Students' Proficiency in ASL and Spoken English on a scale of 1-5

	ASL (<i>n</i> =75)	Spoken English (<i>n</i> =75)
1- Can express most anything	41	28
2- Can express many things	22	23
3- Difficulty expressing many things	8	10
4- Difficulty expressing most things	1	2
5- Does not use the language (5)	3	22

Table 2

Language Use Across Programs

Language of Instruction (<i>n</i> =75)	
ASL and visual forms of English	33
ASL with spoken English support	10
Spoken English with sign support	20
Spoken English with ASL/English interpreter	10
Spoken English only	2
Program Communication Philosophy (<i>n</i> =75)	
ASL/English bilingualism	45
Total communication	19
Spoken English with ASL/English Interpreter	9
Oral/Aural and/or listening-and-spoken-language	2

Table 3*Narrative Trait Scores*

	N	Min	Max	Mean	SD
Development of Ideas	62	1.0	3.0	1.74	0.49
Organization	62	1.0	3.0	1.70	0.51
Style	62	1.0	3.0	1.74	0.51
Word Choice	62	1.0	3.3	1.98	0.61
Sentence Fluency	62	1.0	3.1	1.84	0.58
Conventions	62	1.0	3.1	1.81	0.59
Total	62	6.0	18.1	10.82	3.19

Table 4*Argumentative Trait Scores*

	N	Min	Max	Mean	SD
Development of Ideas	57	1.0	3.0	1.59	0.54
Organization	57	1.0	2.8	1.57	0.53
Style	57	1.0	3.2	1.71	0.61
Word Choice	57	1.0	3.3	1.79	0.63
Sentence Fluency	57	1.0	3.2	1.78	0.63
Conventions	57	1.0	3.4	1.81	0.64
Total	57	6.0	18.9	10.24	3.52

Table 5*Argumentative-with-sources Trait Scores*

	N	Min	Max	Mean	SD
Development of Ideas	49	1.0	3.1	1.70	0.62
Organization	49	1.0	3.0	1.65	0.58
Style	49	1.0	3.4	1.81	0.69
Word Choice	49	1.0	3.4	1.91	0.68
Sentence Fluency	49	1.0	3.4	1.88	0.67
Conventions	49	1.0	3.4	1.91	0.69
Total	48	6.0	19.5	10.86	3.90

Table 6

Total Scores by Genre for Student who Responded to All Prompts

	N	Min	Max	Mean	SD
Narrative	35	7.1	17.1	11.68	2.98
Argumentation	35	6.0	18.9	10.85	3.75
Sources	35	6.0	19.5	11.24	4.21

Table 7

Total Scores by Grade Band and Genre

Grade	Genre	N	Min	Max	Mean	SD
9th-10th	Narrative	36	6.0	18.1	10.78	3.55
	Argumentation	35	6.0	16.9	9.88	3.58
	Sources	30	6.0	17.1	10.24	3.15
11th-12th	Narrative	26	6.5	16.6	10.87	2.68
	Argumentation	22	6.0	18.9	10.81	3.43
	Sources	19	6.1	19.5	11.83	4.80

Table 8*Total Writing Scores Disaggregated by Age of ASL Exposure*

Genre	Age of ASL Exposure	N	Min	Max	Mean	SD
Narrative	B-3 yrs	26	6.0	18.1	11.07	3.36
	4-7 yrs	25	6.5	16.6	10.97	3.03
Argumentation	B-3 yrs	20	6.0	18.9	10.78	4.11
	4-7 yrs	25	6.0	16.9	9.69	3.22
Sources	B-3 yrs	16	6.0	19.5	11.83	4.51
	4-7 yrs	23	6.0	19.5	10.36	3.77

Table 9*Total Writing Scores Disaggregated by ASL Skill*

Genre	ASL Skill	N	Min	Max	Mean	SD
Narrative	Expresses Most Anything	36	6.5	18.1	11.10	3.19
	Expresses Many Things	17	6.0	17.1	10.58	3.53
	Difficulty Expressing Many Things	8	6.5	11.9	9.4	1.71
Argumentation	Expresses Most Anything	29	6.0	18.9	10.86	3.53
	Expresses Many Things	15	6.0	15.2	9.71	3.09
	Difficulty Expressing Many Things	8	6.0	16.9	8.41	3.59
Sources	Expresses Most Anything	27	6.0	19.5	11.64	4.40
	Expresses Many Things	14	6.0	13.2	9.03	2.60

Table 10

Total Writing Scores Disaggregated by Spoken English Skill

Genre	Spoken English Skill	N	Min	Max	Mean	SD
Narrative	Expresses Most Anything	18	6.0	18.1	12.36	3.58
	Expresses Many Things	19	6.4	16.3	10.68	3.25
	Difficulty Expressing Many Things	8	7.1	12.5	9.83	1.68
Argumentation	Expresses Most Anything	14	7.2	18.9	12.43	3.42
	Expresses Many Things	20	6.0	16.4	10.39	3.20
	Difficulty Expressing Many Things	7	6.0	16.9	9.9	3.82
Sources	Expresses Most Anything	12	8.5	19.5	14.83	3.62
	Expresses Many Things	18	6.0	15.9	10.07	3.15
	Difficulty Expressing Many Things	6	6.7	16.2	9.52	3.49

Figure Legend

Figure 1. *Distribution of Narrative Scores*

Figure 2. *Distribution of Argumentative Scores*

Figure 3. *Distribution of Argumentative-with-Sources Scores*