

The Written Expression Performance of Students with Hearing Loss: Results from an Implementation of the Auditory-Oral Approach

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ABSTRACT

Written expression skills play an important role in the development of the linguistic, academic and social skills of individuals from their school years onwards. The aim of this study was to evaluate the written expression performance of hearing-impaired students who receive auditory-oral education, and examine the student characteristics that affect performance. The study participants were 36 fourth, sixth, seventh and eighth grade students with hearing loss. The results of the study show that students received a mean total score of 60.59 out of 100 for written expression. Chronological age explained 26% of the variance in written expression, age at the first hearing aid fitting explained 43% and 20% was explained by the duration of preschool education. The results indicated that in addition to school education, early identification and early intervention affect the written expression performance of school-age students with hearing loss.

Keywords: hearing loss, writing skills, auditory-oral approach, balanced literacy, writing process

INTRODUCTION

Written expression involves coding thoughts, experiences and information using written symbols, in line with the purpose and the language skills of the author (Albertini, Marschark, & Kincheloe, 2015). Just as it is with listening, speaking and reading skills, the development of writing skills is directly related to the interaction between linguistic skills. Hearing loss, which causes delays in the development of listening and speaking skills, directly affects literacy skills during school years. This is because literacy skills require the use of phonological, syntactic, semantic and pragmatic skills, which start with the development of verbal language in the preschool years.

As is the case for children with normal hearing, expressing thoughts in a written format, following rules and a certain order, is a difficult task for children with hearing loss (Mascia-Reed, 2012). This is because written expression requires the simultaneous use of many skills. These include, deciding what to write about, the organization of thoughts prior to writing and selecting words that express the intended meaning, while paying attention to the relationship between letters and sounds. Written expression also requires forming sentences that follow syntax rules, making proper use of punctuation marks during writing and also reviewing and revising the text after writing. Due to the use of various skills prior to, during and after writing, the development of written expression skills is viewed as a process, and instructional practices are based on the process of writing (Dostal, Bowers, Wolbers, & Gabriel, 2015). The adoption of the writing process approach is very important for children to develop positive attitudes toward reading and writing, set reading and writing goals. This approach is also important for producing quality written work, particularly for children who struggle with or are delayed in developing their linguistic skills (Tompkins, 2014). With the adoption of the writing process approach, which is generally acknowledged to comprise prewriting, drafting, revising and editing, and publishing, children with hearing loss improve their written expression skills, similar to children with normal hearing (Girgin & Karasu, 2007; Schirmer, Bailey, & Fitzgerald, 1999; Schley & Albertini, 2005; Wolbers, 2007; Wolbers, Dostal, & Bowers, 2011; Wolbers, Dostal, Graham, Branum-Martin, Kilpatrick, & Saulsbury, 2016).

The Balanced Literacy Approach, which has its roots in the Whole Language Approach, enables the implementation of the writing process in the form of meaningful activities, as it treats linguistic skills as a whole in the acquisition and development of literacy skills (Tompkins, 2014). In the balanced literacy approach, verbal language, reading, comprehension, writing, voice skills, vocabulary, content knowledge, strategy teaching and spelling are considered together (Farris, Fuhler, & Walther, 2004). Interactive writing, structured writing, patterned writing, journal writing and shared writing activities can be implemented in a balanced literacy program. Teachers' guides published in Turkey by the Ministry of National Education (MEB) do not mention the writing process in the context of written expression activities, but learning outcomes are set within the

framework of the writing process. In addition, the section on activities mentions free writing, sensory writing, group writing, guided writing, critical writing and creative writing methods, similar to balanced literacy practices (MEB, 2015). These practices, which are included in the guides and are activity-based, include the writing process; however, in studies conducted with students with normal hearing, due to implementation problems such as prewriting activities not being possible in crowded classrooms and the failure to review written products together, it has been found that students have difficulty in selecting topics and are not willing to write (Kurudayioglu & Karadag, 2010), are unable to use language effectively (Calp, 2015) and have limited vocabularies (Cer & Agrelin, 2016).

Children with hearing loss face many difficulties in the development of written expression skills (Dostal *et al.*, 2015; Strassman & Schirmer, 2012; Wolbers, 2007). Studies show that delays in the development of verbal language and reading skills are reflected in written products, when compared with their peers with normal hearing students with hearing loss write shorter compositions, use fewer verbs and clauses, usually form sentences with simple tenses, make mistakes in spelling and syntax and have difficulty organizing and concluding their thoughts (Albertini & Schley, 2011; Gormley & Sarachan-Deily, 1987; Karasu & Girgin, 2007; Schirmer, 2000; Wolbers, 2007; Yoshinaga-Itano & Downey, 1992; 1996). To deal with these difficulties, authentic in-class activities that take the stages of the writing process into account, and strategies to be underlined according to the needs of the students should form the basis of instructional practices. For example, the development of strategies such as identifying the purpose and the topic prior to writing, ordering thoughts when preparing a draft, organizing thoughts by forming connections between events, and identifying and correcting mistakes in a text by making use of syntactic and semantic clues, affect written expression performance. It is reported that students with hearing loss perform at levels similar to their peers with normal hearing when the development of linguistic, academic and social skills is supported, an education program tailored to individual needs is followed, and strategy teaching and the writing process are included (Akay, 2011; Antia, Reed, & Kreimeyer, 2005; Geers & Hayes, 2011; Heefner & Shaw, 1996; Girgin & Karasu, 2007; Wolbers, Dostal, & Bowers, 2011).

Some studies report that the fitting of cochlear implants at an early age, which is becoming increasingly common in recent years, limits the delay that children with hearing loss experience in the development of their reading and writing skills, and also results in the improvement of literacy skills, due to the development of verbal language skills (Connor & Zwolan, 2004; Geers, 2002; Johnson & Goswami, 2010; Spencer, Tomblin, & Gantz, 1997; Tomblin, Spencer, & Gantz, 2000). Even so, in addition to general factors that affect literacy skills of children with normal hearing, such as intelligence, learning processes socioeconomic status and school education, this improvement also depends on the early fitting of the implant, together with the presence and quality of auditory-oral education prior to and after the implant (Chute & Nevins, 2003; Geers, Nicholas, & Moog, 2007; Geers & Hayes, 2011; Marschark, Rhoten, & Fabich, 2007; Paul, 2008; Pisoni, Cleary, Geers, & Tobey, 1999; Turan, 2006). The literacy approach adopted at a school, the school culture, academic quality of the practices, teacher development and ensuring family participation are the main factors in determining the overall quality of an educational environment (Mascia-Reed, 2012). Auditory-oral education, which offers important advantages in the development of literacy skills, should not be interpreted as the use of hearing aids and verbal communication in an haphazard and unplanned way in the school environment. In addition to the intensive use of activities targeting listening and speaking skills following the fitting of hearing aids at an early age, to develop academic skills auditory-oral education requires the intense and systematic implementation of education programs based on hearing and verbal language (Moog, 2002).

The evaluation of academic skills not only makes it possible to shape education programs by identifying the individual needs of students, it also allows tracking the benefit that the student gets from the current program. In the international literature, the written expression skills of children with hearing loss were first evaluated by Heider and Heider in 1940, and until the 1970s, syntax errors in sentences written by students with hearing loss, sentence length, and compliance with writing conventions were used as the criteria in evaluations (e.g. Greenberg & Withers, 1965; Heider & Heider, 1940; Myklebust, 1964; Wilbur, 1977). In subsequent studies, criteria used in the evaluation of written products began to include content and sections of a text, the organization of thoughts and the diversity of vocabulary, based on the idea that a text should be evaluated as a whole (e.g. Burman, Evans, Nunes, & Bell, 2008; Gormley & Sarachan-Deily, 1987; Heefner & Shaw, 1996; Klecan-Aker & Blondeau, 1990; Yoshinago-Itano & Synder, 1985; Yoshinago-Itano & Downey, 1992; 1996). In 2000s, on the other hand, studies focused on teaching methods that supported the development of written expression skills (Antia, Reed, & Kreimeyer, 2005; Cheng & Rose, 2009; Dostal *et al.*, 2015; Easterbrooks & Stoner, 2006; Lang & Albertini, 2001; Schirmer, Bailey, & Fitzgerald, 1999; Schley & Albertini, 2005; Wolbers, 2007; Wolbers, Dostal, & Bowers, 2011; Wolbers *et al.*, 2016), and examined the impact of

developments in hearing aids and cochlear implants on the written expression skills of students with hearing loss (Geers & Hayes, 2011; Nelson, 2008; Spencer, Baker, & Tomblin, 2003).

Studies conducted in Turkey evaluated the written products of students with hearing impairment in various educational environments (Efe, 2016; Erdiken, 1989; 1996; 2003; Girgin & Karasu, 2007; Karasu, 2004; Tiryaki, 2014; Tuncay, 1980; Turgut, 2012), identified the shortcomings of students with hearing loss in the editing and revising stage (Karasu, 2014), and examined the effect of use of cochlear implants on written expression (Yaşamsal, 2010). In some of these studies (Efe, 2016; Girgin & Karasu, 2007; Karasu, 2004; Turgut, 2012; Yaşamsal, 2010), the written expression performance of students was evaluated using the Written Expression Skills Evaluation Form developed by Yıldızlar (1994) and adapted by Karasu (2004). The Written Expression Skills Evaluation Form, which is also used in the present study to evaluate students' written products, is an analytical evaluation form that consists of title, organization, narrative diversity and compliance with writing conventions sections, with a total score of 100. The present study, which evaluates results from an implementation of the auditory-oral approach, can contribute to the identification of needs that arise over time concerning written expression skills of students with hearing loss, and revision of education programs on this basis. This is because the academic success of an educational environment depends on conducting systematic evaluations of the applied activities and the evolving needs of the students (Mascia-Reed, 2012). The findings of the present study are expected to contribute to audiologic interventions and educational environments for students with hearing loss, by underlining the benefits that students obtain from an auditory-oral educational environment and the importance of the variables that affect written expression skills. The aim of this study is to evaluate the written expression performance of students with hearing impairment who are taught using the auditory-oral approach. To this end, answers were sought to the following questions: (a) What are the skill levels of students with hearing impairment, in terms of title, organization, narrative diversity, compliance with writing conventions and overall written expression? (b) Which student characteristics account for the written expression scores?

METHOD

This study uses the descriptive and correlational model to identify the written expression levels of students with hearing loss and to examine the student characteristics that explain written expression scores. The descriptive model serves to establish the current situation, and the correlational model is used to identify interactions between the multiple variables (Gay, Mills, & Airasian, 2012).

Participants

This study was conducted in the Education and Research Center for Hearing-Impaired Children (ICEM), established in 1979 by Anadolu University. ICEM provides preschool, elementary, and middle school education to children with hearing loss, using the auditory-oral approach. In addition to following the MEB curricula, the center runs literacy programs within the framework of the balanced literacy approach and holds group lessons and one-on-one activities based on individual needs of the students. In accordance with the MEB curriculum, independent writing activities commence in the fourth grade, and students are asked to write individual stories. Therefore, the participants in this study were 36 fourth, sixth, seventh and eighth grade students with hearing loss attending ICEM in the 2015-2016 academic year. In this academic year, there were no fifth graders with hearing loss attending ICEM. Prior to the research, written permission was obtained from the parents of students with hearing loss for participation in the research. Seven students with IQ scores lower than 85 on the Wechsler Intelligence Scale for Children-Revised (WISC-R), who had been diagnosed with a learning disability and neurological problems, were not included in the study. Descriptive statistics concerning demographic, educational and audiological characteristics of the participants in the study are reported in Table 1 in the form of categorical and continuous variables.

Table 1: Descriptive statistics of participant characteristics (n = 36) *Note.* dBHL = decibel Hearing Level

Categorical Variables	<i>N</i>	%
Grade		
4th Grade	12	33.3
6th Grade	2	5.6
7th Grade	14	38.9
8th Grade	8	22.2
Parental Education		
Received	19	52.8
Not Received	17	47.2
Preschool Education		
Received	26	72.2

Not Received	10	27.8	
Continuous Variables	Mean	SD	Minimum-Maximum
Age (months)	155.80	22.42	117-190
Hearing level [dBHL]	99.58	12.93	70-120
Age at the first hearing aid fitting (months)	16.33	9.88	5-40
Age of cochlear fitting (months)	56.85	19.50	24-120
Age of starting preschool education (months)	43	12.09	34-77
Duration of preschool education	21.52	16.08	0-36
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As Table 1 shows, 12 (33.3%) of the participants were fourth graders, 2 (5.6%) were sixth graders, 14 (38.9%) were seventh graders, and 8 (22.2%) were eighth graders. Thirty-one students had profound hearing loss (90 dBHL and above), and 5 students had severe hearing loss (70 - 89 dBHL). A total of 26 (72.2%) students received preschool education from ICEM, whereas 10 (27.8%) did not. The chronological ages of the students varied between 9 years and 9 months, and 15 years and 10 months. The age at which the first hearing aid fitting was made varied from 5 months to 3 years and 4 months. Of the students, 27 had cochlear implants, and 9 were wearing behind-the-ear hearing aids.

Data Sources

Data for the study were collected using the student information form, which contained items on student characteristics, and the scores given to the students' stories. The student information form, developed to identify characteristics that explain written expression skills, contained items on the demographic, audiological and educational characteristics of the students. Files kept at the audiology clinic and the parents were other sources of data for the student characteristics.

In order to assign written expression scores to the students, first, the written products were obtained from the students, and then these were scored using the analytical scoring method. The quality of a written product is directly related to the way in which it is obtained. Prewriting activities enable the students to share their feelings and thoughts on the subject/event, drawing on their knowledge and experiences, and to initiate, develop and conclude narratives. Prewriting activities can be performed using various materials, by sharing events on a single card or sequential cards, using newspaper stories, or by discussing scenes from a movie (Burman *et al.*, 2008; Yoshinago-Itano & Downey, 1996). In this study, the prewriting activity was carried out using five sequential picture cards depicting a dog stealing food from a bag and running away with it, children chasing the dog, getting caught up in the traffic and crowds, before the dog finally brings the food to its puppies.

Events on the sequential picture cards were shared with the students in one-on-one environments, as part of the prewriting activity. Then the stories written by the students were scored using the Written Expression Skills Evaluation Form. The Written Expression Skills Evaluation Form, based on analytical scoring, consists of four sections: title, organization, narrative diversity and compliance with writing conventions. The form has a maximum total score of 100, with a maximum of 3 points for the title, 51 points for organization, 24 points for narrative diversity, and 22 points for compliance with writing conventions. In the title section, evaluation is based on whether the writing has a title and if so, whether the title is relevant to the content. In the Written Expression Skills Evaluation Form, the section that contributes most to the total score is the organization section. This is because the organization involves the ordering of ideas in terms of the introduction, development and conclusion, recounting the main events, forming connections between the events, creating the message content, and drawing a conclusion. In the narrative diversity section, spelling and the use of words, sentence structure and vocabulary skills are evaluated. The section on compliance with writing conventions focuses on punctuation marks, capitalization, paragraphs and layout.

Procedure

To obtain the written products, prewriting activities were held between May 27 and June 5, 2015, using sequential cards in one-on-one sessions with each student, and then the students were asked to write a story about the event. To ensure the consistent performance of the prewriting activity for every student, an activity plan was developed and this plan was followed during the activities. In the prewriting activity, the students' narratives were accepted and the same questions were asked to every student concerning the events depicted on the cards. Following the prewriting activity, students were asked to write a story; no visual or verbal clues were given during the writing stage, and no time limits were imposed. Together, the prewriting activity and the writing stage lasted for about 15-25 minutes. For reliability and validity analysis, the activities were video-recorded.

Validity and Reliability Process

In a master's thesis, Efe (2016) reports that the sequential cards used in this study to obtain written products were examined by two field experts in terms of their story grammar, component integrity, contents, age and grade suitability, and content validity as prewriting activity material. The present study uses the Written Expression Skills Evaluation Form, which has been used in previous studies conducted in Turkey and was shown by Karasu (2004) to have content validity.

In the present study, as part of the reliability analysis, treatment integrity was examined and the inter-rater reliability of the story scores was calculated. Reliability analysis was conducted by a field expert who viewed the video recordings and examined the story scores of 18 randomly selected students. Treatment integrity was found to be 100% and inter-rater reliability was found to be 99%.

Data Analysis

In line with the research questions, two principle statistics were used for the research data analysis. To determine the written expression performance of the students, descriptive analysis was made regarding the title, organization, narrative diversity and compliance with writing conventions. To identify the variables that explain the written expression scores, correlation coefficients between the student characteristics and written expression scores were calculated, and multiple linear regression was used to examine chronological age, age of first

hearing aid fitting and duration of preschool education. The strength of the relationship between a dependent variable and the dependent variables that affect variation in the dependent variable can be identified using multiple linear regression analysis (Field, 2005). In these analyses, the probability of making a type I error was set at $p \leq .05$.

RESULTS

In what follows, descriptive results and correlational results concerning written the expression scores are presented.

Descriptive results

To answer the first research question, the descriptive statistics relating to the scores of the students with hearing impairment for their written expression skills, as well as for the dimensions of the titles, organization, narrative diversity and compliance with writing conventions, are reported in Table 2.

Table 2: Descriptive statistics concerning the scores for written expression skills and its dimensions for the students with hearing impairment (n = 36)

Dimension	Mean	SD	Minimum-Maximum	K*
Title	2.67	.95	0-3	3
Organization	27.39	5.60	16-39	51
Narrative diversity	17.51	3.04	9-23	24
Compliance with writing conventions	13.03	2.91	7-18	22
Total score	60.58	10.40	41-77	100

* The maximum possible score for each dimension.

As Table 2 shows, students who participated in the study received a mean total score of 60.58 out of 100 for written expression. Standard deviation of the total score for written expression was 10.40. Student scores varied between 41 and 77. Student scores on the dimensions of title, organization, narrative diversity and compliance with writing conventions have a homogeneous distribution. Descriptive statistics concerning scores for the dimensions of title, organization, narrative diversity and compliance with writing conventions, which together make up the total written expression score, are reported in Table 3.

Table 3: Descriptive statistics concerning scores for the dimensions of title, organization, narrative diversity and compliance with writing conventions

Title		Number of Students	Percentage (%)
Has title?	Yes	32	88.9
	No	4	11.1
	Total	36	100
Title related to subject?	Related	32	100
	Not related	0	0
Total		32	100

Organization		Mean	SD	Min. Max.	K*
Introduction	Has a separate paragraph	.89	.32	0-1	1
	Explains the subject or main argument	2.98	.51	2-4	5
	Presents the subject clearly	2.98	.56	2-4	5
Development	Has a paragraph that outlines the main argument	.53	.51	0-1	1
	Presence of side arguments in support of the main argument	3.28	1.14	1-5	6
	Events, feelings and thoughts are presented in a way that is logically consistent and orderly	4.72	1.00	3-7	10
	Presents the subject/main argument clearly	4.41	1.02	2-7	10

Conclusion	Avoids repeating ideas	2.97	.17	2-3	3
	Has a separate paragraph	.50	.51	0-1	1
	Reaches a conclusion	4.14	1.40	2-7	9
Narrative diversity		Mean	SD	Min. Max.	K*
Spells words correctly		4.61	1.10	2-6	6
Uses words correctly and properly		5.30	.86	2-6	6
Sentence structure is correct		4.17	1.49	2-7	8
Avoids word repetition when explaining ideas		3.42	.64	2-4	4
Compliance with Writing Conventions		Mean	SD	Min. Max.	K*
Paper layout		2.50	1.06	1-4	4
Legible writing		3.25	.84	1-4	4
Correct use of punctuation marks		4.08	1.71	2-8	10
Correct use of upper and lower case letters		1.78	.42	1-2	2
Paragraph order		1.41	.70	0-2	2

* The maximum possible score for each dimension.

As can be seen in Table 3, four of the students did not use a title for their writing, while 32 used a title related to the subject. Students received a mean score of 27.39 out of 51 for organization. In the introduction section of the organization, students received the same mean score out of 5 for the sub-dimensions of *explaining the subject or the main idea* (Mean=2.98, SD=.51) and *presenting the subject clearly* (Mean=2.98, SD=.56). In the development section, the students received the highest scores for *presenting events, feelings and thoughts in a logically consistent and orderly manner* (Mean=4.72, SD=1) and *presenting the subject/main idea clearly* (Mean=4.41, SD=1.02). For these sub-dimensions, which were scored out of 10, the mean scores were very close to each other. In the development section, the highest mean score was received for *avoiding the repetition of ideas* (Mean=2.97, SD=.17), scored out of 3. In the conclusion section, students received a mean score of 4.14 out of 9 for drawing a conclusion, with a standard deviation of 1.4. The maximum possible score for the narrative diversity section, which considers skills related to vocabulary and the correct use of words and sentences, is 24. The students received a mean score of 17.51 for narrative diversity. The highest mean scores in the narrative diversity section were received for *using words correctly and appropriately* (Mean=5.30, SD=.86), which was scored out of 6, and *avoiding word repetition when explaining ideas* (Mean=3.42, SD=.64), which was scored out of 4. Standard deviations for these two sub-dimensions show a homogeneous distribution of scores. The dimension of compliance with writing conventions, scored out of 22, considers punctuation, spelling and format. Students received a mean score of 13.03 for compliance with writing conventions. The mean score for the *correct use of punctuation marks* was 4.08 out of 10, with a standard deviation of 1.71. The highest mean score in the dimension of compliance with writing conventions was received for the *correct use of upper and lower case letters*, which was scored out of 2 (Mean=1.78, SD=.42). Table 4 reports the correlation between the total written expression scores of the students with hearing impairment and scores for its dimensions.

Table 4: Correlation between total written expression scores and scores for its dimensions

Variables	2	3	4	5
1 Title	.36*	.236	.434**	.477**
2 Organization		.620**	.571**	.913**
3 Narrative diversity			.605**	.818**
4 Compliance with writing conventions				.804**
5 Total				

As Table 4 shows, there are significant correlations between; on the one hand, total written expression scores of students, and on the other, scores they received for the dimensions of title, organization, narrative diversity and compliance with writing conventions.

Correlational results

The aim of the second research question was to identify the variables that explain the written expression scores of the students with hearing loss. Accordingly, to begin with the relationships the participant characteristics had with one another and with the written expression score were examined using the Pearson Moment Product Correlation, then the variables to be included in the regression equation were selected and a hierarchical multiple regression analysis was conducted. Prior to the analyses, tests were conducted to see if the assumptions of the regression analysis were met. As meeting the assumptions of the regression analysis automatically means those of the correlation analysis are met too, there was no need for a separate testing of assumptions for the correlation analysis.

Testing assumptions of the analysis

Assumptions of multiple regression analysis are normality, linearity, multicollinearity and singularity, homogeneity and independence of errors. To meet the *normality* assumption for regression, univariate and multivariate normality distributions must be tested. The p-value in the Shapiro-Wilks test was $p > .05$, and kurtosis and skewness coefficients were between -1.5 and 1.5, indicating that the univariate normality assumption was met in this study (Tabachnick & Fidell, 2013). Although it is not possible to directly examine multivariate normality, the Mahalanobis distance value can be used to identify outliers, to get an idea of normal distribution. The Mahalanobis distance value was not greater, for any of the participants, than the value (11.34) indicated in the table of critical χ^2 values, indicating that multivariate normality assumption was met (Field, 2005). *Linearity* assumption was also met as the graph of expected and observed standard errors had a linear slope (Field, 2005). A *multicollinearity* problem is seen when the correlation between variables is very high ($r > .90$ or $.80$), tolerance value is lower than $.20$, or the VIF (Variance Inflation Factor) value is higher than 10 (Stevens, 2009). In this study, the values of the correlation matrix (see Table 5), the minimum tolerance value (.46) and the maximum VIF value (2.17) indicate the absence of a multicollinearity problem. We also took care to ensure that the singularity assumption was met, which refers to a variable not consisting of multiple underlying variables (Tabachnick & Fidell, 2013). The interaction effect of the chronological age, which was included as a control variable, with explanatory variables was $p > .05$ in all comparisons, indicating that the *homogeneity of regression slopes* was met. For the assumption of *independence of errors* to be met, Durbin-Watson values should be between 1.00 and 3.00 in all of the regression analyses. In the present study, these values (1.64-1.85) remained within the specified limits, indicating that the errors were independent.

Results of the Regression Analysis

Table 5 reports the results of the correlation analysis conducted prior to multiple regression.

Table 5: Correlations between student characteristics and written expression scores among students with hearing loss (n = 36)

Variables	2	3	4	5	6
1 chronological age (months)	-.13	-.18	.13	.42*	.51*
2 Hearing level (dBHL)		-.27	.56*	-.14	-.01
3 Age at the first hearing aid fitting (months)			-.36*	-.67**	-.74**
4 Age of cochlear fitting (months)				.14	.18
5 Duration of preschool education (months)					.91**
6 Total score for written expression					

Note. dBHL = decibel Hearing Level, * $p < .05$, ** $p < .01$

As Table 5 shows, the total score for written expression is significantly correlated with chronological age ($r = .51, p < .05$), age of first hearing aid fitting ($r = -.74, p < .01$), and the duration of preschool education ($r = -.91, p < .01$).

As a result, in addition to chronological age, which was identified as the main determinant based on correlation values and theoretical expectations, age of first hearing aid fitting and duration of preschool education were selected as the explanatory variables for written expression score in this study. To measure the degree to which these variables explain total written expression scores, two separate hierarchical multiple regression analyses were conducted. The reason for this was to be able to gauge the explanatory power of each variable independently from each other. In the first analysis, age at which the first hearing aid was worn was included in the equation, in addition to the control variable of chronological age, which is expected to be the main determinant. In the second analysis, duration of preschool education was included in the equation, with

chronological age and age at the first hearing aid fitting, as the control variables. This was done to separate, as far as possible, the individual effects of the age at the first hearing aid fitting and the duration of preschool education, which are highly correlated (.67). The detailed results of the hierarchical multiple regression analysis are presented in Table 6.

Table 6: Variables explaining total written expression scores

Explanatory Variables	β	t	R	R^2	ΔR^2
Equation I					
Chronological age	.38	3.86**	.51	.26	.26
Age at first HA fitting	-.67	-6.77**	.83	.69	.43
Equation II					
Chronological age + Age at first HA fitting	.18/- .26	2.78*/-3.29*	.83	.69	.69
HA fitting					
Duration of preschool education	.66	7.68**	.94	.89	.20

Note. HA = Hearing Aid, * $p < .05$, ** $p < .01$

The results on Table 6 show that both hierarchical multiple regression equations, which had a total written expression score as the dependent variable (age at the first hearing aid fitting was the explanatory variable in the first equation, with chronological age as the control variable; duration of preschool education was also included in the second equation, with chronological age and age at first hearing aid fitting as control variables) were statistically significant [$F_{\text{Equation1}}(1, 34) = 11.69, p < .05$ and $F(2, 33) = 36.49, p < .01$, $F_{\text{Equation2}}(3, 32) = 86.68, p < .01$]. In the first analysis, chronological age, which was entered into the equation first, explained 26% of the variance in total written expression score. With the subsequent inclusion of age at first hearing aid fitting in the equation, total variance explained increased to 69%. That is to say, inclusion of the age of first hearing aid fitting resulted in a significant increase of 43 percentage points in total variance explained.

In the second analysis, chronological age and age at first hearing aid fitting, entered into the equation first, explained 69% of the variance in total written expression score. With the subsequent inclusion of the duration of preschool education into the equation, total variance explained increased to 89%, a significant increase of 20 percentage points.

In sum, chronological age contributed 26%, age at first hearing aid fitting contributed 43%, and duration of preschool education contributed 20%, the three variables together explaining 89% of the variance in the written expression score.

DISCUSSION

The findings of the present study, the aim of which was to evaluate the written expression performance of students with hearing impairment who received education with the auditory-oral approach, are discussed in what follows within the framework of research questions.

What are the skill levels of students with hearing loss regarding written expression and its dimensions of title, organization, narrative diversity and compliance with writing conventions?

The 36 students with hearing impairment who participated in the study received a mean total score of 60.58 out of 100 for written expression, with a standard deviation of 10.40. Of the participants 27 had cochlear implants, and 9 wore behind-the-ear hearing aids. Although the small number of participants did not allow for a statistical comparison to be made of the written expression scores of students who had cochlear implants and hearing aids, students who had cochlear implants received a mean total score of 60.59, whereas students who wore hearing aids received a mean total score of 60.55. Compared with traditional hearing aids, cochlear implants contribute to the development of verbal language and literacy skills of children with severe and profound hearing loss (eg. Geers, 2002; Geers, 2003; Johnson & Goswami, 2010; Tomblin, Spencer & Gantz, 2000). However, for cochlear implants to improve the language skills of children with congenital hearing loss, the age of implant fitting and auditory-oral education received prior to and after the implant are very important (Geers, Nicholas & Moog, 2007; Marschark, Rhoten & Fabich, 2007; Pisoni *et al.*, 1999, Turan, 2006). Cochlear implants fitted before the age of 2, in particular, contribute to the development of verbal language skills of the child, with positive consequences for the development of literacy skills during school years (Geers, Nicholas & Moog, 2007). In this study, the mean scores of students who had cochlear implants and hearing aids were close to one another. This can be explained by the participants in this study having their implants fitted between 24 and 120 months, which is considered to be a late age for implants.

Studies conducted in Turkey with elementary school and middle school students with normal development report mean written expression scores of 57.89 (Yılmaz & Aklar, 2015), 60.82 (Ak, 2011) and 76.14 (Çelik, 2012). In the international literature, comparisons of the quality of written products of students with and without hearing loss show that 17 year old students with hearing loss are comparable to 9-10 year old students with normal hearing (Albertini & Schley, 2011; Mayer, 2010; Paul, 2008). The manner in which written products were obtained and the activities used in this process directly affect the quality of the products. The medium levels of written expression scores observed in studies conducted in Turkey, for students with normal development, can be explained by these studies obtaining written products by asking students to write about a topic of their own choice, or a given topic, without having conducted prewriting activities beforehand. In the present study, on the other hand, written products were obtained by first sharing with the students sequential cards containing a narrative structure and events, and then asking students to write a story about the cards. This prewriting activity may have made it easier for students with hearing loss to organize their thoughts, narrate the events and write them in a certain order. In other studies conducted with children with hearing impairment, using the same evaluation form, written expression scores of students with hearing loss were found to be lower (Efe, 2016; Girgin & Karasu, 2007; Karasu, 2004; Turgut, 2012). The higher scores observed in the present study may be a result of various audiological and educational variables. Individual characteristics are important factors that affect academic achievement among children with hearing loss, as is the case among children with normal development. Among children with hearing loss, in particular, audiological and educational variables, such as age at which the first hearing aid is fitted, age of starting formal education, parent education and preschool education, play an important role in the development of language skills, and by extension, the academic skills of the students (Geers & Hayes, 2011; Girgin, 2012). The higher mean scores for written expression among students with hearing loss observed in this study, when compared with other studies conducted in Turkey, can be explained by early diagnosis and hearing aid fitting, as well as features of the educational environment. This is because the early fitting of hearing aids that are appropriate for the loss, only ensures the transmission of sounds to the individual, but does not guarantee the automatic development of the language skills of children with hearing impairment, as in their peers with normal hearing. Therefore, the parental education that immediately follows the fitting of the hearing aid, listening activities, which form the basis of verbal language skills and a balanced literacy program, are crucial (Lewis, 1998; Turan, 2006).

There is a direct relationship between the quality of the educational environment and student achievement. In cases of children with hearing loss, the most important factor that determines the quality of the educational environment is an education program tailored and implemented by taking individual needs into account (Schirmer, 2000). Studies conducted in recent years on the improvement of written expression scores of students with hearing loss usually focus on Strategic and Interactive Writing Instruction (SIWI) activities (Dostal & Wolbers, 2014; Dostal *et al.*, 2015; Wolbers, 2007; 2011; Wolbers, Dostal, & Bowers, 2012; Wolbers *et al.*, 2016). SIWI includes instructional practices based on strategic, interactive, linguistic and metalinguistic, balanced, guided to independent, visual scaffolds, and authentic principles. Authentic writing practices, based on balanced literacy, comprise purposive and meaningful writing activities placed within the educational program in a balanced way. In instructional practices, a balance should be established between the teacher acting as a model and direct strategy teaching, and language skills should be treated as a whole (Dostal *et al.*, 2015). Strategy teaching involves the demonstration of various writing strategies to students, such as title, organization of ideas and identifying spelling errors, and supporting the use of these strategies (Wolbers *et al.*, 2016) In their quasi-experimental study, Wolbers *et al.* (2016) provided 18 hours of instruction to children with hearing impairment to examine the impact of SIWI on written expression. They found that following SIWI instruction, the students' narrative and persuasive essays had improved. However, the authors noted that students with hearing loss have additional needs to improve their language skills, and their written expression experiences required development.

In the present study, a significant relationship was found between the total written expression scores of students, on the one hand and on the other, scores for title, organization, narrative diversity and compliance with writing conventions. Thirty-two (89.9%) of the 36 students were able to produce titles for their essays, and these titles were relevant to their writing content. The organization section considered content characteristics, that is to say, whether students organized their ideas, paying attention to the introduction, development and conclusion parts, explained the main idea and supported it with auxiliary ideas, presented the events in sequential order and came to a conclusion. In the present study, the students received a mean score of 27.39 out of 51 for organization, with a standard deviation of 5.60. Various studies report that students with hearing loss, similar to students with normal hearing, have difficulties in organizing their thoughts, explaining the main idea, and writing about events in a logical order (Antia, Reed, & Kreimeyer, 2005; Gormley & Sarachan-Deily, 1987; Klecan-Aker & Blondeau, 1990; Shirmer, 2000; Yoshinago-Itano & Synder, 1985; Wolbers, Dostal, & Bowers, 2011). In writing instruction, a balanced literacy approach should be adopted to establish a balance between grammar, mechanical aspects, the organization of thoughts and the meaning of sentences. The difficulties students with

hearing loss have with syntax make it harder for teachers to establish this balance, resulting in an emphasis being placed on syntax rather than content during activities (Mayer, 1999). The process approach used to improve written expression skills require the use of the main principles of the writing process (Schirmer, 2000).

In the beginning of this process, the teacher attracts the students' attention to the writing subject, and encourages them to make drafts of their essays. In the drafting stage, students are not expected to correct spelling and grammar mistakes, and their writing is not edited (Albertini, Marschark, & Kincheloe, 2015). The editing and revising stage, which follows the writing stage, is for reviewing the essay in terms of content, spelling, grammar and writing conventions. Students with hearing loss face problems with enriching the content of their writing in the editing and revising stage, have difficulty identifying and correcting their mistakes, and usually focus on the mechanics of their writing (Albertini, Marschark, & Kincheloe, 2015; Graham, MacArthur and Schwartz, 1995). Therefore, completing the editing and revising stage, together with the hearing-impaired student, in one-one-one settings where the teacher acts as a model, provides the student with an opportunity to identify and correct their mistakes, and supports students on the way to becoming independent writers (Reimer, 2001). Middle school students with hearing loss are reported to have greater benefits from the teaching of writing strategies when compared with older students (Wolbers *et al.*, 2016). Results of the present study, conducted at ICEM in the 2015-2016 academic year, show that students with hearing loss benefit from auditory-oral education based practices, group lessons that are held in line with MEB curricula but enriched on the basis of individual needs, and one-on-one activities that contribute to the development of verbal language and literacy skills.

Difficulties faced by hearing-impaired children with vocabulary and syntax can affect their story writing skills (Albertini, Marschark, & Kincheloe, 2015). Students with hearing loss perform at a lower level in terms of morphological and syntactic skills when writing, but their scores for semantic and rhetorical skills are at a comparable level with their normal-hearing peers (Wolbers, Dostal, & Bowers, 2011). The narrative diversity section considers vocabulary, word usage and compliance with syntax rules when forming sentences. In the present study, the students received a mean score of 17.51 out of 24 for narrative diversity, with a standard deviation of 3.04. Because of the delay they experience in the development of language skills, to develop their writing skills, children with hearing loss need more intensive strategy teaching compared with their normal-hearing peers (Wolbers, Dostal, & Bowers, 2011). This teaching should be supported with group literacy and content area activities, as well as one-on-one activities taking the individual needs of the students into account (Luckner & Isaacson, 1990; Karasu, 2014; Schirmer, 2000). Reading materials used in the classroom to develop grammar and vocabulary are very important for written expression skills. Awareness of story structure develops in parallel with the development of reading skills. This awareness allows students to identify and analyze elements of story structure, and use them in their own stories. For example, the skills of ordering events, forming connections between events and associating sentences and paragraphs make hearing-impaired students more fluent, critical and confident writers (Albertini, Marschark, & Kincheloe, 2015).

In addition to having content and vocabulary problems, children with hearing loss also experience difficulty in complying with writing conventions (Antia, Reed, & Kreimeyer, 2005; Giddens, 2009; Negrete, 2015). The section on compliance with writing conventions focuses on punctuation marks, capitalization, legibility and layout. In the present study, the students with hearing loss received a mean score of 13 out of 22 for compliance with writing conventions. This finding indicates that students with hearing loss need strategy instruction concerning the mechanics of writing, such as punctuation marks, use of upper and lower case letters and layout, to be held in group and one-on-one sessions. As part of the education program followed at the school, one-on-one instructional conversations are held every day on a regular basis, within the framework of the balanced literacy approach, in addition to group sessions. In addition, each student participates in two individualized reading and one-on-one writing conference sessions a week. Of the 40 hours of group lessons each week, 15 are devoted to Turkish in the elementary school, and 10 in the middle school. On the basis of these findings, it is recommended that literacy strategies should receive more emphasis in literacy and content area courses, the number of authentic writing activities should be increased, and writing conferences should involve more intensive editing and revising activities. Parental involvement in the education process and active use of reading and writing in home environments also contribute to the development of students' literacy skills (Mascia-Reed, 2012). The Program for International Student Assessment (PISA) results show that the mean score received by 15 year old students in Turkey for reading skills is lower than the OECD average (Tas, Arici, Ozarkan, & Ozgurluk, 2016). Students in Turkey face a large number of multiple choice tests starting during elementary school, and the scores for these tests form the basis for admissions. This has resulted in parents and students focusing on preparing for these tests in home environments too, and spending most of study time on solving multiple choice questions. Therefore, the active use of reading and writing by parents in daily life, informing parents about activities held at school, and supporting literacy activities at home can improve the written expression performance of students.

Which student characteristics explain written expression scores?

It was found that chronological age, age at first hearing aid fitting and duration of preschool education combined, explained as much as 89% of the variance in the written expression score. This finding can be explained by the collection of data from a single school attended by hearing-impaired students with similar audiological and education characteristics. In terms of participant characteristics, children who had hearing aids at an early age and received preschool education received higher scores for written expression. Student age explained 26% of the variance in written expression scores. In a study conducted with hearing-impaired adolescents, Musselman and Szanto (1998) failed to find a significant difference between the scores of different age groups. Yoshinaga-Itano and Downey (1996) argue that improvement in compliance with grammar rules slows down in adolescence, for hearing-impaired adolescents, as well as normal-hearing adolescents. However, in line with the findings of the present study, correct use of grammar, sentence complexity and syntax accuracy increase linearly with age during the elementary school and middle school years (Heefner & Shaw, 1996; Powers & Wilgus, 1983; Wolbers, Dostal, & Bowers, 2012; Yoshinaga-Itano, Snyder, & Mayberry, 1996).

Many factors affect the development of hearing-impaired children's language skills. These factors include the hearing level of the child, the use of a hearing aid, mode of communication, socioeconomic status of the family, the education program followed at school, and the quality of education (Karchmer & Mitchell, 2011; Marschark, Shaver, Nagle, & Newman, 2015). Antiana, Reed and Kreimeyer (2005) found that gender, grade, level of hearing loss and free lunches combined explain 18% of the variance in written expression scores. The early fitting of hearing aids and use of hearing aids prior to cochlear implant (especially in the first 6 months after birth) affect the academic achievement of children with hearing loss (Geers & Hayes, 2011; Kasai, Fukushima, Omori, Sugaya, & Ojima, 2012; Sugaya, Fukushima, Kasai, Kataoka, Maeda, Nagayasu, Toida, Ohmori, Fujiyoshi, Taguchi, Omichi, & Nishizaki, 2015). Yoshinaga-Itano and Apuzzo (1998) found that hearing-impaired children who were diagnosed in the first 6 months after birth and were fitted with the correct hearing aids had better receptive and expressive language skills compared with children who were diagnosed and fitted with hearing aids between 7 and 18 months. In the present study, age at the first hearing aid fitting explained 43% of the variance in the written expression scores of elementary school and middle school students, and duration of preschool education explained 20%. The ages of the participants at first hearing aid fitting varied between 5 months after birth and 3 years and 4 months. As was previously mentioned, 18 of the participants in the present study were fitted with hearing aids in the first 12 months after birth. Hearing age, the age at which hearing aids begin to be used effectively, plays an important role in the development of literacy skills (Geers & Hayes, 2011; Girgin, 2012). Adoption of auditory-oral approaches in the education of children with hearing loss requires early identification and intervention, and an aggressive audiological program. The aggressive audiological program refers to intensive audiological and education arrangements, including the early fitting of hearing aids, early cochlear implantation, parental education and child development (Marschark & Spencer, 2009). At ICEM, from where data for the present study were collected and which is based on aggressive audiological management, early identification and intervention is performed by the audiology clinic. High-quality preschool experiences that are made possible with the early fitting of hearing aids contribute to the development of verbal language and literacy skills, and affect school achievement (Akay, 2016; Dickinson & Porche, 2011). When presented with a large number of diverse activities in the preschool period, children develop a richer vocabulary, become interested in writing, recognize story structures, are able to narrate events, are interested in the sounds that make up language, and attempt to read and write on their own (Fields, Groth, & Spangler, 2004; Reutzel & Cooter, 1996). Findings of the present study underline the importance of early identification and intervention in the education of children with hearing loss. The findings also indicate that instructional practices tailored to individual needs in the preschool period play an important role in minimizing the difficulties hearing-impaired children face in school years. However, this finding does not mean that every hearing-impaired student who benefited from early identification and intervention will perform at the same level. This is because following early identification and intervention, school education, school culture, literacy approaches, activities held and strategies, affect literacy in school years (Mascia-Reed, 2012). During the school years, strategy teaching as part of the writing process can target the areas with which the students have difficulties, such as creating content, organizing their thoughts, sentence structure, spelling and the mechanics of writing. Writing conferences held in small groups or one-on-one sessions provide important opportunities for sharing ideas and giving interactive feedback to students about their writing, and teaching strategies (Barbeiro, 2011). These opportunities may allow students to make additions to or subtractions from their essays, change the ordering of events, emphasize connections between events, draw conclusions, pay more attention to syntax and sentence structure, and check spelling and grammar, improving their skills concerning content, narrative and compliance with conventions.

CONCLUSION AND LIMITATIONS

This study, which evaluated the written expression performance of hearing-impaired children who were taught using the auditory-oral approach, was conducted with 36 hearing-impaired students attending Anadolu University's ICEM, and their written expression performance may not be representative of that of other school age children with hearing loss in Turkey. In addition, the study is limited in that sequential cards were used to obtain written products, and the written expression skills evaluation form was used to evaluate these products. Future studies can focus on the stages of the writing process, analyze practices for different types of writing, examine difficulties faced by students with hearing loss in this process, and offer solutions. In addition, the written products of students who have had cochlear implants before the age of 2 can be examined to identify the effect of cochlear implants on literacy skills.

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