

Writing Skills of Hearing-Impaired Students Who Benefit from Support Services at Public Schools in Turkey

H Pelin Karasu^{1,*}

¹Anadolu University, Eskisehir/Tepebasi, Turkey

*Correspondence: Anadolu University, Eskisehir/Tepebasi 26470, Turkey. Tel: 90-532-787-4823. E-mail: hpkarasu@anadolu.edu.tr

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Abstract

Support services provide an essential role for hearing-impaired students attending public schools, in terms of improving their language and academic skills. In this study, the writing skills of hearing-impaired students enrolled in public schools were evaluated, and the relationship between the writing scores, audiological variables and educational variables were examined. Seventeen students, who were enrolled in the primary and middle school classes of public schools and benefited from the support services, participated in this study. The results of the study indicated that the mean writing score of the students was 68.35 out of 100. It was determined that there is a relationship between the age of first hearing aid and the duration of preschool education. According to the results of the study, it can be stated that hearing-impaired students enrolled in public schools benefit from the support services designed according to their individual needs, along with early exposition to implant and early inclusion in education.

Keywords: *hearing impairment; writing skills; public school; support services; inclusion*

1. Introduction

Inclusion practices in the education of hearing-impaired children are becoming prevalent worldwide. Inclusion practices can be conducted in a wide range of ways, such as enrolling hearing-impaired students in formal education classes throughout the school day, providing resource room services at certain times of day whilst the students are attending formal education classes, or offering self-contained classes within the public schools. Some researchers are concerned that enrolling hearing-impaired students in formal education classes may not offer adequate opportunities, in terms of interaction and communication skills (Ramsey, 1997; Stinson & Antia, 1999). Then again, evaluating the academic skills of hearing-impaired students in inclusive environments is of great importance, in order to determine the appropriate educational environments and identify support services for these students (Antia, Reed & Kreimeyer, 2005).

Writing is a challenging task for all students, as expressing thoughts in words requires the accurate spelling of words, the correct use of syntax, semantic and pragmatic skills and the accurate use of punctuation. Writing expression, which requires the combined use of various skills, is an even more challenging and complex task for hearing-impaired students, who experience a delay in the development of their language skills (Schirmer, 2000). In various studies, hearing-impaired students were found to perform poorly in writing skills (Geers, 2003; Schirmer & Mcgouhg, 2005) and their writing scores were found to be lower than their peers with normal hearing abilities (Antia et al., 2005; Spencer, Baker & Tomblin, 2003). Two reasons for this could be that hearing-impaired children are not able to acquire language experiences, as rich as that of their peers with normal hearing abilities, and that teaching practices on reading and writing are insufficient (Karasu, 2004; Most, Aram & Andorn, 2006; Wolbers, 2007).

The theory that with the help of cochlear implant practices, the oral language skills of hearing-impaired students could improve and be at a level closer to their peers with normal hearing abilities, has led to the expectation that these students could have better literacy skills. Nevertheless, regardless of how improved their oral language skills are, hearing-impaired students enrolled in public schools require support services in order to achieve the literacy levels targeted for their peers with normal hearing abilities. For instance, hearing-impaired students could have difficulty in acquiring skills that their peers with normal hearing abilities naturally and rapidly acquire, due to overcrowded

classrooms, the inadequate physical conditions of the classrooms, or being unable to use their hearing aids effectively. In studies where the literacy performances of hearing-impaired students were examined, it was determined that the achievement scores of students in formal education environments were higher than the scores of students enrolled in special schools (Karchmer & Mitchell, 2003). This could be explained by the diversity of individual characteristics in the students enrolled in public schools when compared to those enrolled in special schools. For instance, the level of hearing impairment in hearing-impaired students attending public schools could be lower, they could perform better in oral communication skills, or they may not have any disabilities other than hearing impairment (Schildroth & Hotto, 1996). Therefore, these students could perform better than the students enrolled in special schools. This does not mean that hearing-impaired students enrolled in public schools could necessarily display the same performance as their peers with normal hearing abilities (Antia et al., 2005). Therefore, the academic needs of hearing-impaired students enrolled in public schools should be identified and the programs that could support these needs should be discussed. In this study, the writing performances of hearing-impaired students enrolled in public schools and who benefited from the support services, were analyzed.

In the international literature there are various studies on the writing skills of students enrolled in special schools (e.g. Cheng & Rose, 2009; Dostal, Bowers, Wolbers & Gabriel, 2015; Geers & Hayes, 2011; Heefner & Shaw, 1996; Lang & Albertini, 2001; Schley & Albertini, 2005; Wolbers, Dostal & Bowers, 2011). However, the number of studies on hearing-impaired students enrolled in public schools was found to be limited. In the existing studies, evaluations were made of the writing skills of hearing-impaired students that spent a certain amount of time in formal education classes (Antia, Jones, Reed & Kreimeyer, 2009; Antia et al., 2005); the writing tasks of students enrolled in resource room programs and mainstream settings were analyzed (Musselman & Szanto, 1998; Spencer et al., 2003), various inclusion programs were examined (Most et al., 2006), and hearing-impaired students, who attended self-contained classrooms, were discussed in terms of their writing skills (Easterbrooks & Stoner, 2006; Wolbers, 2007). In the study by Antia et al (2005) on 110 hearing-impaired students, who were enrolled in public schools, students were found to perform within the low mean score levels in contextual conversions, contextual language, and story construction sub tests. The most challenging fields for these students were identified as vocabulary and syntax. In the light of this finding, the researchers determined that the academic needs of students enrolled in public schools should be considered, regardless of the level of hearing impairment. In a follow-up study (Antia et al., 2009), 197 hearing-impaired students, who were given individual education plans (IEP) and included in support services with specialist teachers, were observed for a period of five years, in terms of their academic performances. According to the results of the study, in terms of their language/writing skills, 55%-76% of the students scored at or above the average. Looking at the findings of both studies, it could be claimed that hearing-impaired students enrolled in public schools require support services, and that they could benefit from the implementation of special education systems, according to their needs. In another study on support services (Most et al., 2006), kindergarten students with hearing impairment, enrolled in individual or group inclusion programs, were analyzed in terms of their literacy skills. According to the results of these studies, hearing-impaired students scored lower than their peers with normal hearing abilities. Another finding of the study indicated that students enrolled in individual inclusion scored higher than those enrolled in group inclusion programs.

In the study by Musselman and Szanto (1998), hearing-impaired students enrolled in resource room programs and mainstreamed settings scored higher in semantic and convention skills; however, their scores in grammar use were rather low. The results of the study showed that the scores of the students enrolled in the Auditory/Oral (AO) program were higher than those enrolled in the Total Communication (TC) program. In another study, conducted in similar educational environments (Spencer et al., 2003), the relationship between literacy skills and early cochlear implant exposition was analyzed. At the end of the study, it was concluded that students with cochlear implants used less vocabulary than their peers with normal hearing abilities in their written stories, and that there were significant differences with their peers with normal hearing abilities, in terms of the correct use of grammatical structures. In a study on hearing-impaired students enrolled in self-contained classrooms within public schools (Easterbrooks & Stoner, 2006), it was observed that there was an increase in the use of adjectives by the students. However, the researchers stated that there was a decrease in the students' use of grammar elements in the stories and that this was due to their increased focus on using adjectives. In another study (Wolbers, 2007), an examination was made of the development of writing skills in 16 hearing-impaired students, who were provided with support services for their literacy skills. In the study, a morning message was used within the scope of balanced and interactive writing instruction. Morning Message provides teachers and students with opportunities to construct a written text around the experiences of one student. The study concluded that students benefited significantly from the instructional practices in terms of contextual language, editing/revising skills and word identification.

In Turkey, according to the Special Education Services Regulations, a large number of hearing-impaired students are

referred to public schools (MEB, 2012). It has been observed that the referral procedure is based on the decisions of the family and there is a need for more detailed evaluations regarding the listening, speaking, reading and writing skills of the students (Akay, Uzuner & Girgin, 2014; Akdemir-Okta, 2008). Additionally, even though there are legal regulations regarding the support services provided for the hearing-impaired students enrolled in public schools, in practice these services were not being provided (Akdemir-Okta, 2008; Gurgur & Uzuner, 2010). Hearing-impaired students who are enrolled in overcrowded classrooms together with their peers with normal hearing abilities, may have difficulties in achieving the targeted aims of the program, by remaining solely in the classroom without receiving support services (Akay, 2011). For instance, the Turkish Curriculum aims for the following writing skills in the 6th Grade: (a) compliance with writing conventions, (b) Planned writing, (c) writing different types of texts, (d) evaluating one's own writing tasks, (e) attaining the habit of expressing oneself in writing, (f) comprehending and using writing and punctuation rules (MEB, 2015, s. 38). The curriculum contains various activities to achieve these aims; for example, eliciting a level-appropriate picture and writing the events, discussing the topic in the classroom prior to writing, creating mind maps using the keyword, researching the important past events and writing about them (MEB, 2015). These aims and activities require teaching exercises, even for the students with normal hearing abilities and who do not experience any difficulties in the development of their listening, speaking and reading skills and they are not easy for the students to achieve by themselves. In Turkey, studies on the writing performances of students with normal hearing abilities concluded that students displayed a medium level of performance, they had limited vocabulary and that they had difficulties in using the features regarding the structures of stories or reaching conclusions (Ak, 2011; Çelik, 2012; Yılmaz & Aklar, 2015). Therefore, in order for hearing-impaired students, who experience delays in the development of their linguistic skills, to achieve these aims, together with their peers with normal hearing abilities, the areas they lack should be determined and supported. In Turkey, there are a limited number of studies on the writing skills of hearing-impaired students who are enrolled in public schools. In these studies, the mean scores of hearing-impaired students, out of a hundred, were found to be 20.60 in the study by Karasu (2004); 43.13 in the study by Turgut (2012), and 46.99 in the recent study by Efe (2016). The common conclusion reached in these studies was that the decision to enroll hearing-impaired students in public schools should be given carefully, systematic evaluations should be performed when taking this decision, and that in public schools these students required support services. In this study, hearing-impaired students, who were enrolled in public schools and provided with systematic support services by specialist teachers, were examined in terms of their writing skills. Writing skills, which interact with listening, speaking and reading skills, is a linguistic skill that has a vital impact on academic performance and social life during the school years. Together with the other linguistic skills, the improvement of writing enriches the objectives of language use, enables students to gain new linguistic experiences, and facilitates the acquisition of new knowledge that exists in the content area. Swanwick and Marschark (2010) emphasized that studies on hearing-impaired children and its fields of application were conducted separately, similar to studies on education in general, and that the studies should focus on the results obtained from the applications, as well as contributing to practices regarding the education of hearing-impaired children. In view of this opinion, the results of this study could contribute to examining the needs of hearing-impaired students enrolled in public schools, in terms of their writing skills, as one of the academic skills and determining the variables regarding writing, as well as planning and implementing support services, commencing from the enrollment of hearing-impaired students in public schools. The purpose of this study is to evaluate the writing skills of hearing-impaired students who are enrolled in public schools and provided with support services. In accordance with this aim, answers to the following questions were sought: (1) What are the skill levels of hearing-impaired students, in terms of title, organization, narrative diversity, accuracy in writing conventions and total writing skills? (2) Is there a significant relationship between the total writing scores and the grade level, chronological age, the age of first hearing aid and the duration of preschool education? (3) Is there a difference between students using cochlear implant and the students using hearing aids in terms of their writing skill levels?

2. Method

This study was designed according to the pattern of descriptive and correlational model with the aim of determining the writing performances of hearing-impaired students enrolled in public schools as well as the relevant variables.

2.1 Participants

Seventeen hearing-impaired students, who were enrolled in public schools, participated in this study. The processes regarding the diagnosis, instrumentation, preschool education and public-school enrollment were performed by the Education and Research Center for Hearing-Impaired Children (ICEM). ICEM is a research center that offers hearing-impaired children certain services of diagnosis, instrumentation, family training, preschool, primary school

and middle school education, as well as providing support services to those enrolled in public schools. Inclusion practices in the preschool period are conducted in kindergarten classes within the center, in which students with normal hearing abilities are also enrolled, while at primary and middle school levels they are conducted in public school classes located on the same campus. The decision to enroll hearing-impaired students in public schools is taken by audiologists in the center; specialist teachers and a team specializing in the development of linguistic and literacy skills in hearing-impaired children. The decisions are based on (a) communication skills, (b) listening and speaking skills, (c) literacy and academic skills, (d) social and emotional development, and (e) parental opinions of the students. The specialist teachers in the ICEM offer the hearing-impaired students enrolled in primary and middle schools support services of 4 hours a week, according to their individual needs.

Descriptive statistics, categorical variables and continuous variables regarding the demographic, educational and audiological characteristics of the participants are presented in Table 1.

Table 1. Descriptive Statistics of Participant Characteristics (n = 17)

Categorical Variable	n	%	
Grade Level			
4th Grade	5	29.4	
6th Grade	2	11.8	
7 th Grade	7	41.2	
8 th Grade	3	17.6	
Continuous Variables	Mean	SD	Minimum-Maximum
Chronological age (month)	147.35	22.87	116-178
Hearing level [dBHL*]	91.29	13.35	66-119
Age of first hearing aid	15.65	7.93	7-29
Age of cochlear implant (months, n=6)	37.33	13.08	19-58
Age of starting preschool education (months)	38.65	4.27	36-48
Duration of preschool education	33.06	4.87	22-36

*dBHL= decibel Hearing Level

As shown in Table 1, there were no students were enrolled in public schools at the 5th grade level in the 2015-2016 academic year. The level of hearing impairment for five students was profound (96 dBHL and above), while it was severe (71 - 95 dBHL) for 11 students and moderate (41 - 70 dBHL) for 1 student. Six students used Cochlear implants and 11 students were using hearing aids in both ears.

2.2 Data Sources

Data was collected through the student information forms and evaluations of the stories written by the students. Information on demographics, audiology and educational values was obtained from the parents and the files located in the audiology clinic of the school. Prior to the writing activity, students were encouraged to talk about five photographs in sequence as a pre-writing activity and were asked to write a story about the events. Stories written by the students were scored according to the Writing Skill Evaluation Form (Karasu, 2004), which was based on analytical scoring. The Writing Skill Evaluation Form contains four sections: Title (3 points), organization (51 points), narrative diversity (24 points) and complying with writing conventions (22 points), and the skills were scored out of 100.

2.3 Procedure

The writing products were obtained between 27th May and 5th June 2015. In one-to-one sessions, prior to the writing activity, the students were encouraged to talk about five photographs in sequence, as a pre-writing activity, and were asked to write a story about the events. This pre-writing activity and the writing phase lasted for approximately 15-25 minutes with each student. These were conducted according to the implementation plan, in order to ensure that the pre-writing activity was conducted in the same way with each student. Accordingly, in the pre-writing activity, the students' expressions were accepted and each student was asked questions about the events in the photos. In the writing activity that was conducted following the pre-writing activity, the students were not provided with visual or verbal clues and there was no time limit. The activities were video-recorded for further use in validity and reliability activities.

2.4 Validity and Reliability Process

The validity of the contents, story structures, completeness of the elements of the sequenced cards and their usability in pre-writing activities was assessed by two specialists in the study by Efe (2016). This study made use of the Writing Skill Evaluation Form, the content validity of which was proved in the study by Karasu (2004).

In terms of reliability, inter-rater reliability was calculated regarding the reliability of the procedure and the story scores. A specialist in the field conducted the reliability study by monitoring exercises given to 10 randomly selected students and scoring the stories. It was concluded that the reliability of the procedure was 100% and the inter-rater reliability was found to be 99%.

2.5 Data Analysis

With regard to the research questions, a descriptive analysis was conducted on the writing performances of the students. A correlation coefficient was calculated for determining the relationship between the writing scores and student characteristics and, a Mann-Whitney-U Test was administered in order to identify whether there was a significant difference between the writing scores of the students using cochlear implants and those using hearing aids. In the analysis, the Type 1 error possibility was taken as $p \leq .05$.

3. Results

With reference to the first research question, the descriptive statistics indicating the skill levels of hearing-impaired students in terms of title, organization, narrative diversity, compliance with writing conventions and total writing skills are presented in Table 2.

Table 2. Descriptive Statistics Regarding the Writing Skills of Hearing-Impaired Students (n=17)

Characteristics	Mean	SD	Min. - Max.	K*
Title	3.00	.00	3-3	3
Organization	31.82	9.97	19-51	51
Narrative diversity	20.18	2.58	16-24	24
Compliance with writing conventions	13.35	4.06	5-19	22
Total	68.35	14.94	46-94	100

* Indicates the base score for each behavior.

As demonstrated in Table 2, the mean writing score of the students was found to be 68.35 out of 100. Looking at the standard deviation and minimum-maximum values, it was observed that the scores relating to organization were not homogeneously distributed (Mean=31.82, SD=9.97). All the students were able to write a title for their writing tasks. It was observed that the most challenging areas for the students were organization and complying with writing conventions. The highest mean score was obtained in the area of narrative diversity, which comprised the selection of vocabulary, accuracy of sentences and word repetitions (Mean. =10.18, SD=2.58). Descriptive statistics regarding the title, organization, narrative diversity and compliance with writing conventions characteristics are shown in Table 3.

As shown in Table 3, organization includes the introduction, development and conclusion sections. Each section requires the writing to be divided into paragraphs, according to the sequence of events and development of thoughts. Students performed better at the start of the events in the introduction section when compared with the development and conclusion sections. In terms of organizing the events and thoughts appropriate to the content, students scored 0.29 (SD=.47) in the development section, and 0.23 (SD=.23) in the conclusion section out of 1. In terms of organization, "writing about the events, emotions and thoughts in a reasonable consistency and sequence" and the "clear presentation of the topic/main idea" characteristics were scored out of 10 and the students attained the mean scores of 5.76 (SD=1.95) and 5.88 (SD=2.06), respectively. The best performance in the organization section was exhibited in the "avoiding the repetition of thoughts" feature, which was scored out of 3 and where all students received full scores. In terms of narrative diversity, the students were observed to receive almost full scores in the "correct spelling of words (Mean=5.35, SD=.86)" and the "correct and proper use of words (Mean=5.59, SD=.62)", which were scored out of 6; as well as in the "avoiding the repetition of words in explaining thought" characteristic (Mean=3.47, SD=.51), which was scored out of 4. In narrative diversity, the mean score of students was 5.76 out of 8 in the "sentence accuracy" characteristic (SD=1.39). In compliance with writing conventions, the most challenging characteristic for the students was the "correct use of punctuation," which was scored out of 10 points (Mean= 4.77, SD=2.70).

Table 3. Descriptive Statistics of Scores Regarding Title, Organization, Narrative Diversity and Compliance with Writing Conventions Characteristics

Title Characteristic		Number of Students	Percentage (%)		
Presence of the Title	Present	17	100		
	Absent	0	0		
	Total	17	100		
Relevance of the title with the topic	Relevant	17	100		
	Irrelevant	0	0		
	Total	17	100		
Writing Organization Feature		Mean	SD	Min.-Max.	K*
Introduction	Presence of the paragraph	.88	.33	0-1	1
	Explanation of the topic or main idea	3.41	1.00	2-5	5
	Clear presentation of the topic	3.29	.98	2-5	5
Development	Presence of the paragraph that explains the main idea	0.29	.47	0-1	1
	Presence of side arguments supporting the main idea	3.71	1.57	2-6	6
	Expressing events, emotions and thoughts in a reasonable consistency and sequence	5.76	1.95	3-10	10
	Clear presentation of the topic/main idea	5.88	2.06	3-10	10
	Avoiding repetition of thoughts	3.00	.00	3-3	3
Conclusion	Presence of the paragraph	0.23	.44	0-1	1
	Reaching a conclusion with the main idea	5.35	2.64	1-9	9
Narrative Diversity		Mean	SD	Min. Max.	K*
Correct spelling of words		5.35	.86	3-6	6
Correct and proper use of words		5.59	.62	4-6	6
Sentence accuracy		5.76	1.39	3-8	8
Avoiding repetition of words in explaining thoughts		3.47	.51	3-4	4
Compliance with writing conventions		Mean	SD	Min. Max.	K*
Paper layout		2.53	1.18	0-4	4
Legible writing		3.35	.70	2-4	4
Correct use of punctuation marks		4.77	2.70	1-8	10
Accuracy of capital and small letters		1.47	.51	1-2	2
Paragraph organization		1.23	.44	1-2	2

* Indicates the base score for each behavior.

The second question of the study related to the relationship between the total writing scores of students and their grade levels, chronological ages, ages of first hearing aid and preschool education periods; however, since the number of participants in the study was low ($n=17$), non-parametric tests were administered.

The Spearman Brown Rank Correlation was administered and it was found that there was a high level of correlation between the grade level and chronological ages of the students ($r=.95, p=.000$). The high correlation obtained indicated that both variables were almost equal; therefore, the grade level was eliminated and the chronological age was accepted as the control variable. The reasons why chronological age was controlled were: (1) the fact that writing skill scores naturally improved with age, depending on education, (2) the presence of significant correlations between chronological age and the age of first hearing aid ($r = -.60, p = .001$) and the preschool education period ($r = .61,$

$p=.009$), and (3) the intention displaying the relationship between writing and other variables independent of age. The results of the correlation analysis conducted upon controlling the chronological age are shown in Table 4.

Table 4. The Correlation of the Age of First Hearing Aid and Preschool Education Period with the Writing Scores in Hearing-Impaired Students ($n=17$)

Control Variable	Variables	2	3
Chronological age (months)	1 Age of first hearing aid	-.70*	-.81*
	2 Preschool education period (months)		.67*
	3 Total writing score		

* $p<.05$, ** $p<.01$

As presented in Table 4, the total writing score was found to have a negative correlation with the age of first hearing aid and a positive correlation with the preschool education period independent of chronological age.

With regard to the third research question, the aim was to determine whether there was a significant difference between students using cochlear implants and the students using hearing aids, in terms of the level of their writing skills. Since the number of students in each group was rather low in the study ($n=6$ and $n=11$), this question was analyzed using the Mann-Whitney-U Test, as a non-parametric comparison test. The results of the analysis are shown in Table 5.

Table 5. The Results of the Mann-Whitney U-Test Displaying the Differences between Students Using Cochlear Implants and Hearing Aids in Terms of Their Writing Scores

Groups	Rank Means	Rank Totals	U	P
Students Using Hearing Aids ($n=11$)	11.00	121.00	11.00	.027*
Students Using Cochlear Implants ($n=6$)	5.33	32.00		

* $p<.05$

As demonstrated in Table 5, there was a significant difference between the students using hearing aids and cochlear implants, in terms of their total writing scores, $U = 11.00$, $p = .027$. Looking at the rank means, it was found that the total writing scores of students using hearing aids (Mean=74.27, $S = 12.82$) was higher than those using cochlear implants (Mean=57.50, $S = 12.91$).

4. Discussion

The findings of this study, the aim of which was to evaluate the writing skills of hearing-impaired students who are enrolled in public schools and provided with support services, are interpreted below.

4.1 What Are the Skill Levels of Hearing-Impaired Students in Terms of Title, Organization, Narrative Diversity, Accuracy in Writing Conventions and Total Writing Skills?

Hearing impairment is said to have a domino effect on the linguistic and literacy development, academic achievement and social/emotional development of a child (American Speech/Language Hearing Association [ASHA], 2017). Hearing impairment limits individuals in terms of their skills in perceiving the speaking sounds and leads to delays in linguistic skills, as well as a decrease in literacy and academic performances (Wilkens, 2015; Swanwick & Marschark, 2010). Hearing-impaired children enrolled in public schools are included in literacy teaching practices, despite the fact that they lack the knowledge and linguistic experiences that their peers with normal hearing abilities possess. In studies, hearing-impaired students, who were enrolled in public schools and had intermediate or advanced levels of impairment, were observed to experience delays in their writing skills when compared with their peers with normal hearing abilities (Antia et al., 2005; Wolbers, 2007). Minimizing this delay depends on determining the linguistic and academic needs of the students enrolled in public schools and providing them with systematic support services. In this study, where writing performances were evaluated, hearing-impaired students enrolled in public schools received a mean score of 68.35. Looking at the studies in Turkey conducted with students with normal hearing abilities, the mean writing scores of students were found to be 57.89 (Yılmaz & Aklar, 2015), 60.82 (Ak, 2011) and 76.14 (Çelik, 2012) out of 100. In the current study, the mean writing scores of hearing-impaired students were found to be quite close to the mean scores obtained by the students with normal hearing abilities in other studies, which could be interpreted as the positive effects of the writing process and the support services. In terms of the writing process, it was observed that, in studies

conducted with the students with normal hearing abilities, no pre-writing activities were performed and the students were asked to write stories about a given topic. In this study, in the pre-writing activity, the events displayed on the sequenced photo cards were discussed and students were asked to do the writing afterwards. The presence of the pre-writing activity may have led students to obtain higher writing scores (Burman, Evans, Nunes & Bell, 2008). Furthermore, in studies on hearing-impaired students enrolled in public schools in Turkey and who were not provided with support services, but which used the same evaluation tools and preliminary activities, the mean writing scores were found to be 20.60 (Karasu, 2004), 43.13 (Turgut, 2012) and 46.99 (Efe, 2016). It could be interpreted that hearing-impaired students enrolled in public schools benefited from the support services that are provided, according to their needs, as support services address the needs of hearing-impaired students in public schools in terms of linguistic and academic skills, prevent the behavioral and social problems and enable students to successfully participate in the general classroom environment (Glomb & Morgan, 1991). The fact that the academic benefits for the hearing-impaired students enrolled in formal education classes are not clear and significant, displays the necessity for support services (Antia et al., 2005). Support services require that hearing-impaired students should be provided with educational services with teaching practices applied in the areas they need in the classroom or individual learning environments. In this study, the teachers of hearing-impaired students enrolled in public school provided them with support services in self-contained environments. This support included literacy, mathematics, social studies and science. In literacy skills support in public schools, parallel to those included in the curriculum, the students were given exercises on reading expression, answering questions, completing stories and grammar, and the writing tasks were revised once week within editing or revising phases. The achievement of support services provided in self-contained environments, depends on the provision of support parallel to the curriculum implemented in public schools, preparation of IEPs according to the needs of students, and systematic evaluation of achieving the aims (Batu & Kircaali-İftar, 2007). Furthermore, activities and teaching strategies applied in support services play an essential role in explaining the students' writing achievements (Antia et al., 2005). In the light of this, the results of this study could be interpreted as reflecting the achievements of the support services provided.

In this study, it was observed that the most challenging areas for the students were organization and complying with writing conventions. Organization is the section that creates the content of the product where introduction, development and conclusion parts of the text are organized and the events are written with a reasonable consistency. The findings of this study were in compliance with the results of other studies, which showed that although hearing-impaired students were able to talk about the main idea, they gave quite little information about the details and had difficulties in organizing their thoughts in writing (Antia et al., 2005; Klecan-Aker & Blondeau, 1990; Wolbers et al., 2011; Yoshinaga-Itano, Snyder & Mayberry, 1996a, 1996b). In addition to this, in a longitudinal study conducted with hearing-impaired students enrolled in public schools that received support services, it was emphasized that students showed improvements in advanced writing skills, such as organizing their thoughts and carrying main ideas to a conclusion (Antia et al., 2009). As with students who have normal hearing abilities, using the writing process in teaching also has a positive effect on the writing performances of hearing-impaired students (Wolbers et al., 2011). Writing expression starts with explaining "why" and "for whom" the text is being written. Therefore, in practicing the writing process, students should have authentic aims and determine the reading audience. Talking about the topic prior to writing enables students to improve their listening, speaking and reading skills and provides them with the opportunity to determine their writing aims, organize their thoughts, use the new vocabulary and establish relationships between the events. Additionally, authentic writing activities ensure the use of the rereading and revising phases with the aim of publishing the text (Wolbers et al., 2016). Therefore, hearing-impaired students should be exposed to the writing process in public schools and in self-contained environments with the aim of improving their writing skills, which would help them in constructing the content of the text, as well as in organizing their thoughts (Wolbers, 2007).

Writing conventions include the mechanical characteristics of the text. Hearing-impaired students have difficulties with the correct use of writing conventions and punctuation marks, in addition to the challenges they experience in organizing their thoughts and syntax (Antia et al., 2005; Negrete, 2015). Hearing-impaired students have an increased need for strategy teaching than their peers with normal hearing abilities (Wolbers et al., 2011). Strategy teaching could be performed through the pre-writing, writing and post-writing activities (Schirmer, 2000). For instance, after being taught in class to put a full stop at the end of a sentence and to start the next sentence with a capital letter, editing and revising phases should be completed, when the student is asked to comply with this rule in their writing. Editing and revising includes exercises that enable students to detect and correct their mistakes, as well as encouraging them to become independent writers (Reimer, 2001). In this respect, hearing-impaired students enrolled in public schools could benefit from the support services, in cases where the group activities implemented in public schools and the support services provided in individual environments are conducted together. In order to ensure this, the specialist support

service teacher should cooperate with the public-school teacher and the topics taught at public school classes should be highlighted in support services practices (Mastropieri & Scruggs, 2010; Salend, 2005). This is because content area classes, literacy classes and reading materials studied in the classroom environments affect the improvement of linguistic skills holistically, facilitating the improvement of organization, syntax accuracy, diversity of vocabulary and the mechanical aspects of the text (Wolbers, 2007).

4.2 Is There a Significant Relationship between the Total Writing Scores and the Grade Level, Chronological Age, the Age of First Hearing Aid and the Duration of Preschool Education?

As shown in the findings of the study, a high correlation was found between the grade level and chronological age ($r = .95, p = .000$). Therefore, grade level was eliminated among these related variables and the relationship between chronological age and writing scores was examined. In this study, a relationship was found between the chronological age and writing score. Similar to this finding, in some studies, organization, the complexity of the sentences and syntax accuracy were observed to improve in hearing-impaired students in primary and middle school classrooms according to chronological age (Antia et al., 2005; Heefner & Shaw, 1996; Wolbers et al., 2011; Yoshinaga-Itano et al., 1996b). Conversely, in other studies, the writing skills of hearing-impaired students, who were enrolled in public schools in Turkey and did not receive support services, were analyzed and no relationship was found between the age, grade level and writing performance (Efe, 2016; Karasu, 2004; Turgut, 2012). For instance, a student who is 10 and enrolled in 3rd Grade could score better than a 6th grade student or 8th Grade student who, at the age of 14, received the lowest scores (Efe, 2016). The researchers related this to the fact that the students could not benefit from teaching activities in public-school classrooms and therefore the increase in age or grade level did not explain academic performance.

There are various factors affecting the improvement of literacy skills in hearing-impaired children. Individual and environmental factors, such as early diagnosis of the hearing impairment and early exposure to a hearing aid; early education opportunities, including parent education and preschool education; quality of the educational environment and the curriculum and family environment could all affect the development of linguistic and academic skills in children (Antia et al., 2009; Karchmer & Mitchell, 2011). As observed in the findings of this study and as indicated in the literature, the age of first hearing aid plays an essential role in the development of oral language skills in hearing-impaired students and their literacy skills in the years to come (Geers & Hayes, 2011; Girgin, 2012). In this study, the first hearing aid age of the participants varied between seven and 29 months. Among the 17 participants, 10 started to use implants within the first year following their birth. As well as the quality of the educational environment, the success of early diagnosis and instrumentation depends on the regular use of hearing aids every day, obtaining the maximum benefits from the aids, and solving any technical problems immediately. This is because, despite the presence of early diagnosis and instrumentation, in cases where they are not taught according to their needs, the linguistic development of hearing-impaired students would not be as desired (Pisoni, Cleary, Geers & Tobey, 1999). In light of the findings of this study, it should be mentioned that the participants benefited from the educational program implemented, together with early exposure to hearing aids.

In this study, another variable related to the writing scores was the preschool education period. The literacy development of children is constructed on the experiences they gain at an early age and that continuously develops with new experiences (Easterbrooks, Lederberg & Connor, 2010). Preschool education has an essential role for children, in terms of establishing a relationship between their written and oral language, vocal awareness, vocabulary, syntax and semantic skills. With early instrumentation, qualified preschool experiences affect school achievement by ensuring the improvement of verbal language skills and literacy skills (Dickinson & Porche, 2011). In the current study, it was observed that the participants started preschool education at the age of 3-4 and received preschool education of 2-3 years accordingly. The participants completed their preschool education in the kindergarten classes located in ICEM, starting special education at the age of three and were enrolled in public schools starting from the 1st Grade. Parallel to the literature, the findings of this study emphasize qualified preschool experiences in the education of hearing-impaired students (Easterbrooks et al., 2010).

4.3 Is There a Difference Between Students Using Cochlear Implants and the Students Using Hearing Aids in Terms of Their Writing Skill Levels?

Cochlear implant applications have led to essential modifications in the educational programs and the communications skills of children with advance levels of impairment (Geers & Hayes, 2011). This has been explained through the fact that cochlear implant technology transmits the speaking sounds much better than hearing aids and that, along with other linguistic skills, literacy skills improved respectively. However, the success of cochlear implants in children with congenital hearing impairment depends on the age of first hearing aid and the audio-oral education received before and after the application of the implant (Geers, Nicholas & Moog, 2007). In the literature, it has been stated that cochlear

implant applications, experienced before the age of 2, positively affected the development of linguistic skills and exposure to implants after the age of 2, which is described as late implant, resulted in a failure to improve at the expected level (Spencer et al., 2003). In the study by Harris and Terlektsi (2010) on hearing-impaired students enrolled in mainstream education, among the participants were 30 students, who were exposed to the implant at the age of 42 months or earlier, while 29 were exposed to implants after 42 months. The study concluded that the literacy scores of students with cochlear implants were higher than those using hearing aids. Similarly, in this study, the writing scores of students using hearing aids were higher than the students with cochlear implants. According to the characteristics of the participants, 1 student was observed to wear the cochlear implant at the age of 19 months and the others at the age of 32 months or later. This finding could be interpreted according to the late implant ages of the participants. In cochlear implant applications, it should be considered that the cochlear implant did not replace normal hearing and cannot guarantee oral language and academic achievement alone (Nelson, 2008). Therefore, the positive outcomes of cochlear implant applications on academic achievement depend on the first hearing aid being at an early age, as well as the quality of the educational program being applied in line with the child's needs (Geers & Hayes, 2011).

5. Conclusion

The results of this study emphasize the importance of utilizing support services for hearing-impaired students enrolled in public schools. Support services have an essential role in addressing the problems hearing-impaired students experience in public schools, in terms of their linguistic and academic skills. In this study, it was observed that the hearing-impaired students enrolled in public schools benefited from the support services, designed according to their individual needs, as well as their early exposure to implants and early education. Additionally, the participants of this study were seen to need teaching exercises regarding content organization, the organization of thoughts and writing conventions. In view of this, the following recommendations could be made with the aim of supporting the development of writing skills in hearing-impaired students enrolled in public schools: the writing process should be taught in public school classes and support service procedures, which would enable students to determine their writing aims and organize their thoughts. Guiding the students in finding their mistakes and correcting them at the editing and revising stage would encourage them to become independent writers. Furthermore, cooperation between the public-school teacher and the supporting service teacher and following a parallel pattern in their teaching, according to the needs of the student, are essential for the student's achievement. The participants in this study received four hours of support services a week - one hour in four days - and they participated in editing and revising activities once a week. Extending this period without impeding the public-school curriculum and applying more editing and revising phases would enable students to receive more intensive education and support the development of their linguistic and academic skills. In future studies, the writing processes provided within the support service practices could be examined and the requirements of the students and teaching practices could be determined accordingly. The effects of early treatment with cochlear implants on the development of literacy skills could be analyzed and the literacy skills of hearing-impaired students could be compared to those with normal hearing abilities in the same classroom. The results of these studies would enlighten the planning phases and the application of support services, commencing from the decision to enroll hearing-impaired students in public schools.

The results of this study, where the writing performances of hearing-impaired students enrolled in public schools and support services were analyzed, showed that the hearing-impaired students required support services and they benefited from this service. In the study, a relationship was found between the writing scores and early age of first hearing aid, preschool education, as well as the chronological age. The results of the study emphasize the importance of support services, regardless of language or culture, and the educational practices required by hearing-impaired students enrolled in public schools, in terms of their writing skills.

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