



ELECTRONIC COMMUNICATION SKILLS OF DEAF AND HARD OF HEARING PEOPLE

Original scientific paper

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ABSTRACT

The aim of this paper was to examine the literacy skills of deaf and hard of hearing people in electronic form writing and to compare these skills in relation to standard (“paper-pencil”) writing. The sample included 50 deaf and hard of hearing students aged from 12 to 20 years. The students were supposed to have basic literacy to be able to answer questions by writing. The Questionnaire for determining basic electronic literacy, which consisted of 15 simple questions about the student’s everyday life, was used. Variables used: correct response, vocabulary, and spelling mistakes, i.e., substitution, omission, addition, and metathesis. The test was performed at two different time intervals and in two different forms (standard and electronic forms). Data were processed by descriptive analysis and t-test. More favorable results were obtained in favor of standard writing compared to electronic writing on all variables except for vocabulary. Statistically significant differences were found for the variables vocabulary, omission, and substitution. It is important that there is also communication competence, and especially better language competence expressed in electronic form. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.

Keywords: *electronic communication skills, deaf and hard of hearing people*

INTRODUCTION

From the psycholinguistic aspect, writing is a complex activity, which, in order to learn, requires prior mastery of speech expression. These two activities are extremely interdependent. Well-developed writing is the most developed form of linguistic expression. It must emphasize all the details of a certain situation, in order to be clear to the one who receives a certain message, and even what is left out in the spoken form. “Deaf and hard-of-hearing students form a unique subpopulation of writers, one that exhibits great challenges in learning to write effectively and fluently” (Wolbers, 2007, p. 257).

“Some deaf learners are somehow able to compensate for the lack of auditory access to the spoken language and attain native-like knowledge of the language.

However, many deaf learners accomplish only partial acquisition of the spoken language and experience persistent difficulties in reading comprehension and written expression” (Berent, 2001, p. 124).

Hearing children spontaneously learn to speak. When they go to school, they are systematically trained in writing. In contrast, deaf and hard of hearing children, even today, when the use of cochlear implants is significantly present, often do not have fully developed speech before going to school. They learn speech and writing at the same time. Therefore, it is quite clear why these children often do not reach the ability to express themselves in writing to their hearing peers.

Deaf children write the way they speak. Their written text is generally the best test of language achievement.

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This allows you to find out at the same time where they occur and what are the most common errors. On the other hand, the analysis of the text indicates what, in the corrective rehabilitation procedure, the most attention should be paid to.

Research during the past several generations in the United States and elsewhere has found that deaf children and adults have difficulty with numerous aspects of reading and writing in the language being taught. These range from the smallest units (phonemes and graphemes) to morphemes, syntax, vocabulary, and pragmatics. Bound morphemes, function words, complex grammatical constructions, and verb tenses pose special challenges. (Moore, 2006, p. 52).

Literacy today, in the age of information technology, has an extremely important role in all ages and every segment of social life.

“Computer technology and the Internet have a tremendous potential to broaden the lives and increase the independence of people with disabilities. Those who have difficulty leaving their homes can now log in and order groceries, shop for appliances, research health questions, participate in online discussions, catch up with friends, or make new ones” (Kaye, 2000, p. 124).

According to Henderson, Grinter, and Starner (2005), “in 1982 Barbara Wagreich, a deaf-blind computer professional wrote an article about the possibilities of new technology, email, and how it might prove beneficial for people with disabilities, particularly the deaf...Email was not only a formal medium for business meetings and communications but also an informal tool for maintaining friendships and furthering acquaintances.”

Based on an online survey of deaf and hard of hearing adults, Bowe (2002) points out that results showed that respondents were using e-mail and instant messaging (IM) far more than telephone typewriters (TTY) and relay services. The study participants virtually all had e-mail and IM at home. While the vast majority also had and used e-mail at work, just 1 in 3 had IM at his or her place of employment.

“Short Message Service (SMS) represents the first communication technology that has broken down the barriers between Deaf and hearing individuals. Unintended and unforeseen by the engineers who designed it, the way that texters are using SMS is perhaps a revolution in communication. Extrapolating from research with hearing users, it is predicted that deaf texters will use SMS to increase the bonds between themselves in deaf communities, creating new opportunities to develop relationships, understanding, and intimacy with those not physically present” (M. R. Power & D. Power, 2004, p. 341).

Based on a project conducted, Akamatsu, Mayer, and Farrelly (2005, p. 120) state that “data collected confirm that two-way text messaging technology is indeed useful for deaf adolescents and helps alleviate some of the concerns that have kept them from developing independence as quickly or readily as their hearing peers.”

Henderson et al. (2005) reveal that both Deaf and hearing teens share similar communication goals such as communicating quickly, effectively, and with a variety of people. Distinctions between the two populations emerge from language differences.

Research results showed that Deaf users in Australia are discerning the purposes for which they use each method: SMS for social and personal interactions, TTY for longer communications and (via the relay service) with people and services without TTYs, fax for business and social contact, and computers for personal and business e-mails as well as Web browsing, accessing chat rooms, word processing, games, and study (M. R. Power, D. Power, & Horstmanshof, 2006). Also, an online survey of German deaf people demonstrated that SMS is used most, with more than 96% of respondents having access to a mobile phone. Most use is directed toward sociability (keeping in contact, and making arrangements with friends and family). However, there is some instrumental use (getting tasks or business accomplished, making appointments, and obtaining information) (D. Power, M. R. Power, & Rehling, 2007).

The study conducted by Pilling and Barrett (2007) is the only comprehensive survey of the text communication preferences of deaf people who cannot or prefer not to use voice telephony in the United Kingdom. Respondents used several forms of text communication, selecting them for specific purposes. E-mail was the most widely used form of text communication, but SMS was the most used by younger respondents. The most prominent reasons for liking different forms of text communication were that they were easy or fast. Henderson-Summet et al. (2007) researched the differences and similarities between deaf and hearing teen’s usage of electronic communication media. Five common themes: Identity, Connection, Control, Tension, and Convenience were identified. These themes allow to explore electronic communication from the “use-centric” view of teenagers who are indifferent to the underlying technology supporting this communication.

The study conducted by Okuyama and Iwai (2011) found that deaf high school students use texting for different purposes than do their hearing counterparts. Difficulties associated with the language of technology-mediated communication are identified in the deaf student data. The purpose of Okuyama’s (2013) article is “to explore textism in English as adopted by American deaf adolescents, examining its features and social function within the under-represented population of deaf teens in growing research on texting. This case study collected a corpus of 370 text messages exchanged via cell phone between a high-school pair at a US residential school. The messages indicated that the deaf adolescents adopted various characteristics of textism used by the English-speaking hearing adolescents studied by other researchers. However, the corpus also showed incidents of characteristics unique to the deaf teens’ texting, such as structural transfer from sign language.”

Also, the study by Okuyama (2014) investigated how texting was used by deaf adolescents in Japan. A small corpus of dyadic messages exchanged via cell phone between 2 deaf high-school students at a residential school was collected to examine the features of unconventional spellings typically used in text messages, or “textisms.” The study found that in the pair’s 356 messages, the deaf adolescents adopted characteristics of textisms very similar to those used by the hearing adolescents studied by other researchers on Japanese mobile communication.

It is important to determine the level of literacy skills of deaf and hard of hearing people in electronic form. That is, whether their literacy skills in electronic form are at the level of communication or language competence and whether they are identical to the standard (“paper-pencil”) form.

The aim of this paper was to examine the literacy skills of deaf and hard of hearing people in electronic form writing and to compare these skills in relation to standard (“paper-pencil”) writing.

METHODS

The sample of respondents

The sample included 50 deaf and hard-of-hearing students. The research was conducted by primary (46%) and secondary school students (54%), both genders (36% male and 64% female) (Table 1), aged from 12 to 20 years. The conditions for selecting the sample were: hearing loss above 80 dB, prelingual hearing loss, students having basic literacy to be able to answer questions by writing, and students using email.

Table 1. The sample of respondents

Simple		Gender				School			
		Male		Female		Elementary		High	
Total	%	f	%	f	%	f	%	f	%
50	100.0	18	36.0	32	64.0	23	46.0	27	54.0

Measuring instrument and research conducting manner

To examine the written communication of deaf and hard of hearing students, that is to say, to determine the possible differences in writing communication by standard (“paper-pencil”) or electronic forms, was used the *Questionnaire for determining basic electronic literacy*, which consisted of 15 simple questions about the student’s everyday life. Questions: Say your name. How old and what grade are you? What is the name of the place where you live? Who are your family members? What are your mother’s and father’s names? If you have siblings, what are their names? If you have a house, what does it look like? What do you usually do at home? If you have a pet, what is it and what is its name? What do you like to eat? What clothes do you wear most often? What interests you most at school? Which subjects do you like the most at school? What would you like to do when you finish school? Who do you hang out with the most?

Based on the answers to the questions, it was possible to determine the basic knowledge of syntax, dictionary, and the correctness of writing. Variables used: correct response, vocabulary, and spelling mistakes, i.e., substitution, omission, addition, and metathesis.

The test was performed at two different time intervals and in two different forms.

For the first time, respondents received a questionnaire containing 15 questions in standard (“paper-pencil”) form to which they had to give answers in writing, for 30 minutes. The examination was repeated after 15 days, in order for the students to forget the questions.

The second time, questionnaires were sent to them through e-mail, in electronic form. Also, they were given 30 minutes to answer the questions and return the email to the examiners.

Data processing

Data were processed by descriptive analysis. Frequencies, percentages, and descriptive statistical parameters (minimum, maximum, mean, and standard deviation) were calculated. To test the differences between the results of standard and electronic writing *t*-test was used. SPSS for Windows was used to process data.

RESULTS AND DISCUSSION

In Table 2 the total representation of results for the examined variables is presented.

There is a higher overall prevalence of correct answers in standard writing (645) compared to electronic writing (636), as well as a lower total number of errors in writing (substitution, omission, addition, and metathesis), which indicates favorable results of standard writing. More favorable results of electronic writing in relation to the standard are expressed in the total volume of vocabulary, where deaf and hard of hearing respondents wrote a total of 2678 words in standard writing, in answers to questions, and 2874 words in the e-mail.

Table 2. Frequency of variables

Writing	Correct answers	Vocabulary	Substitution	Omission	Addition	Metathesis
Standard	645	2678	300	189	27	17
Electronic	636	2874	339	255	51	25

Descriptive statistical parameters are presented in Table 3. There are discrepancies in the results of two ways of writing for deaf and hard-of-hearing students. That is, more favorable results were confirmed in favor of standard writing compared to electronic writing on all variables except for vocabulary. The mean for correct answers, with the corresponding standard deviations, in standard writing, was 12.90 ± 1.92 , and electronic 12.72 ± 2.917 , for words in standard

writing 53.56 ± 24.60 , and electronic 57.48 ± 26.83 . The mean for substitutions, with the corresponding standard deviations, in the standard letter was 6.00 ± 4.42 , and electronic 6.78 ± 4.39 , for omissions in the standard letter 3.78 ± 2.44 , and electronic 5.10 ± 4.80 , for additions in standard writing $.54 \pm .79$, and in electronic writing 1.02 ± 1.29 and for metathesis $.34 \pm .56$, and in electronic writing $.50 \pm .79$.

Table 3. Descriptive statistical parameters of variables

Variables	Writing forms	Min	Max	M	SD
Correct answers	Standard	6	15	12.90	1.92
	Electronic	5	15	12.72	2.17
Vocabulary	Standard	18	107	53.56	24.60
	Electronic	7	118	57.48	26.83
Substitution	Standard	0	16	6.00	4.42
	Electronic	0	14	6.78	4.39
Omission	Standard	0	9	3.78	2.44
	Electronic	0	17	5.10	4.80
Addition	Standard	0	3	.54	.79
	Electronic	0	4	1.02	1.29
Metathesis	Standard	0	2	.34	.56
	Electronic	0	3	.50	.79

The influence of the writing form of deaf and hard-of-hearing students on the results of the examined variables was assessed by *t*-test.

Statistically significant differences were found for the variables vocabulary, omission, and substitution.

Table 4. T-test results

Variables	M	SD	SE	t	df	p
Correct answers	.18	1.64	.23	.78	49	.44
Vocabulary	-3.92	12.34	1.74	-2.25	49	.03
Substitution	-.78	3.13	.44	-1.76	49	.08
Omission	-1.32	3.89	.55	-2.40	49	.02
Addition	-.48	1.43	.20	-2.37	49	.02
Metathesis	-.16	.65	.09	-1.74	49	.09

The reasons for the favorable results on most variables in favor of standard writing may be different. These can be the way of mastering writing (students in school primarily learn to write by standard, not electronic

writing), speed of writing during text writing, writing practice, better visibility, and the possibility of continuous monitoring of text written by standard writing on paper and the like.

According to Bowe (2002, p.6), “most important for educators is that strong reading and writing skills are essential if adults who are deaf or hard of hearing are to take advantage of today’s communications technologies.” It is important that there is also communication competence, and especially better language competence expressed in electronic form. Communication competence is sufficient for simple, everyday activities. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.

In addition to convenience and motivational factors, several studies (Akamatsu et al., 2005; Bowe, 2002; Henderson et al., 2005; Henderson-Summet et al., 2007; Okuyama & Iwai, 2011, according to Maiorana-Basas & Pagliaro, 2014) discussed the importance of strong literacy skills in using text-based technologies. Unfortunately, none of the studies investigated the effect of these technologies on literacy development among individuals who are DHH.

The aim of the research conducted by Salikic, Hasanbegovic, and Svraka (2018) was to examine the communication and linguistic competence of a meaningful understanding of the written communication form of deaf persons. Deaf subjects were divided into two groups. One group wrote letters to another group, with the standard form of writing, on a topic of free choice, and the other group responded to the letter. After these correspondences, the letters were analyzed in a way to search for an understanding of the content. The letters were agrammatic with a large number of omitted letters and syntactically difficult to understand. However, children who are deaf, perfectly-recognized the context and responded to letters with understanding. The results of the research showed that the deaf respondents have communication, but not linguistic competence in the written form of communication.

The aim of the second research, by the same authors (2019), was to examine the linguistic structure of the written form of communication for deaf children through the use of simple and complex written sentences, questions asked and answers to questions asked, as well as the extent of the used statements and messages in the form of expression. The research results have shown that the questions were not grammatically correct but the respondents understood their essence and adequately responded to them, that although sentences were not linguistically properly written, deaf children can use the dialogue in written communication, that the respondents have problems in writing complex sentences but that there is a possibility of using complex sentences.

Similar types of research need to be conducted using electronic writing, to determine the electronic language competence of deaf and hard of hearing people.

Hasanbegovic (2012) tested the success of typing and text understanding in deaf children. The success was tested with two computer fonts. The research points out that deaf children make mistakes in writing/typing and also they have problems with understanding standard letters/fonts.

Teaching how to write with the help of computer technology can play a significant role in the development of electronic literacy - electronic linguistic competence.

The aim of the research conducted by Hasanbegovic and Mahmutovic (2014) was to determine the development of syntax in the language development of children who are deaf or hard of hearing, who are taught new linguistic features with the help of computers. It was found that the computer program significantly contributes to the development of syntax.

Also, based on the research conducted by Mahmutovic, Hasanbegovic, and Powlakic Hadziefendic (2018), it can be concluded that there is a statistically significant difference in the implementation of diagnostic procedures when evaluating reading and writing, in favor of the application diagnostic software, in comparison to the classic evaluation method. Applied software-based diagnostics, both theoretically and in practical terms, provide a more efficient and effective way of implementing diagnostic procedures for evaluating speech-language development than classical (“paper-pencil”) estimation methods.

All of the above indicates that knowledge of communication and language electronic competence, and knowledge of the impact of computer technology on their development, can enable the development of special educational and rehabilitation programs and software for training deaf and hard of hearing people for electronic communication, as well as programs for its evaluation.

CONCLUSION

This paper presents preliminary research on the literacy skills of deaf and hard of hearing people in electronic form (electronic communication) and a comparison of this skill in relation to standard (“paper-pencil”) writing. More favorable results were obtained in favor of standard writing compared to electronic writing on all variables except for vocabulary. The reasons for the favorable results in favor of standard writing may be different. These can be the way of mastering writing (students in school primarily learn to write by standard, not electronic writing), speed of writing during text writing, writing practice, better visibility, and the possibility of continuous monitoring of text written by standard writing on paper and the like.

It is important that there is also communication competence, and especially better language competence expressed in electronic form. Communication competence is sufficient for simple, everyday activities. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.

Knowledge of communication and language electronic competence, and the effect of computer technology on their development, can enable the development of special educational and rehabilitation programs and software for training deaf and hard of hearing people for electronic communication, as well as programs/software for its evaluation.

Through the detailed analysis of written content, in future researches, it is necessary to determine the level of literacy skills of deaf and hard of hearing people in electronic form. That is, whether their literacy skills in electronic form are at the level of communication or language competence and whether they are identical to the standard (“paper-pencil”) form. In addition, it is important to determine the impact of computer technology on the development of literacy among people who are deaf and hard of hearing.

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