https://doi.org/10.53656/ped2025-7.04

Research Insights
Изследователски проникновения

SIGN SUPPORTED SPEECH MULTIMODAL TECHNIQUE IN ENGLISH LANGUAGE TEACHING OF BULGARIAN HEARING IMPAIRED CHILDREN

Dr. Diyana Georgieva, Assoc. Prof.
Trakia University (Bulgaria)

Abstract. This paper is dedicated to an experimental study, that aims to identify the effect of Sign Supported Speech on the optimization of teaching English language to Bulgarian hearing impaired children. The study involves 32 deaf and hard of hearing children (ages 9 – 11), divided into 2 equal-sized groups, one of which underwent a 14-week communicative intervention. Receptive and expressive skills were assessed in three domains: vocabulary, grammar, and pragmatics. A significant effect of SSS on vocabulary (F (1. 29) = 7.52, p< .001, partial η2 = 0.24) and grammatical (F (1. 29) = 6.29, p= .02, partial η2 = 0.21) knowledge was identified. At the same time, the results of the pragmatic subtest showed no statistical improvement after SSS application (F (1. 29) = .01, p= .94, partial η2 = 0.00). The recorded positive influence of SSS on the development of English communicative skills in Bulgarian deaf children does not negate the need for future research to confirm and build on the results of this study.

Keywords: English language teaching; hearing impaired children; multimodal; sign supported speech; total communication approach

Introduction

In modern society, the role of the English language is growing exponentially. Knowledge of the language allows getting in touch the world culture, contributes to the social adaptation to the conditions of the constantly changing world. The English language broadens the students' linguistic horizons and promotes overall speech development, which becomes particularly relevant in the education of deaf individuals. The education system is a key to providing favorable conditions for learning a foreign language. Learning English is included as a compulsory subject in Bulgarian mainstream schools, where hearing students share the educational space with many of their deaf peers. It is a known fact that the acquisition of the rules not only of the foreign language but also of the native language by deaf students proceeds at a slower pace and is accompanied by a number of peculiarities. At the same time, the inclusion of individuals with specific educational and com-

municative needs does not change its status as one of the modern challenges of the educational scene (Noguera, Guerrero, Peytscheva-Forsyth, Yovkova 2018). This implies a search for alternative communicative techniques for English language learning that would make its acquisition an attractive and desirable territory for Bulgarian deaf children. Such a technique is Sign Supported Speech (or simultaneous communication – SimCom) – as an integral part of the Total Communication approach, combining different modalities of communication, which makes it a tool for multimodal composition in an educational context.

Literature review

English as a subject is a challenge for all students. For deaf and hard of hearing students, the difficulties are doubled due to certain relations they have to make between the foreign language and their native language, which is essentially more delayed and more specific to master (Balkanska 2009). Nevertheless, the fact that deaf children show quite good results in the initial stage of English language learning is manifested in some studies (Saeva 2022). One of the reasons for these achievements stems from the peculiarities of linguistic systems – for example, in English, unlike Slavic languages, including Bulgarian, nouns and adjectives do not have so many grammatical forms, which makes them easier to remember and use. Another reason of a psychological nature is found in learning attitudes – many deaf children feel some discomfort among their hearing peers, which motivates them to work harder at trying to prove themselves, and as a result receive better grades (Kreimeyer et al. 2000; Angelova 2017). However, the inclusion of teaching techniques such as Sign Supported Speech (SSS), which allows the perception of linguistic information through a combination of manual, visual, auditory and vocal means, has been cited as a leading reason (Daniels 2004; Wijkamp et al. 2010; Werner 1987). Historically, SSS has established itself as a communicative option with a high utility rate among deaf children, children with severe learning disabilities, and/or children with severe communication disorders (Wijkamp et al. 2010). The mechanisms of its influence are related to the high degree of iconicity of manual structures (Kelly et al. 2009); the need for an increased focus of visual attention on the presented signs, facial expression and lips of the communicative partner (Daniels 2001); the integration of auditory and visual information (Woodhouse et al. 2009). And as a final touch, through the full participation of the hands (as articulators) activating kinesthetic sensations, the multisensory fusion of speech articulation, residual hearing, manual articulation, visual perception of the word becomes a catalyst for language acquisition (Daniels 2004). The analyzed literature achievements mainly refer to countries where the use of the multimodal technique has deep pedagogical traditions in the teaching of English to deaf children and pupils, which cannot be claimed for Bulgarian education. The lack of sufficient research on a national and, partly, on a global scale on the problem at hand motivated

the choice of a study which aims to identify the effect of SSS as a multimodal communication technique on the optimization of English language learning for primary school age deaf children.

Theoretical Framework

The present study is based on Total Communication as an educational philosophy whose precise definition involves the combination of communicative techniques sharing different modalities into a single multimodal organism (McFadden 1999). Its essence extends beyond the confines of the simultaneous use of sign and spoken language. Through it, students are trained in (1) making optimal use of residual hearing to acquire spoken language, to make direct contact with the teacher and with the whole environmental information field; (2) building logical connections between aurally perceived (through residual hearing) linguistic data and visual linguistic information (by speechreading and signs) in order to fill in the gaps and reconstruct the whole from its parts (McFadden 1999).

Research evidence shows the positive impact of the approach on all areas of functioning for deaf children: cognitive, language, emotional, academic (Andrews et al. 2004). These are strong arguments for its active application in the classroom (McFadden 1999). Conditions are created for modeling a multimodal learning space that provides an accessible learning environment (Yovkova & Peytcheva-Forsyth 2019) and content delivery from all educational streams by synergistically incorporating different modal resources to enrich semiotic funds of knowledge (Dermendzhieva & Tsankov 2022).

Research Methodology

Design

The study used a randomized control group pretest-posttest research design to evaluate the effectiveness of the SSS multimodal technique in an educational setting. The SSS was used as independent variable in the course of individual and group sessions. The dependent variables defined were the following: knowledge and use of words (lexical component), knowledge and use of syntactic constructions (grammatical component), knowledge and use of pragmatic information (pragmatic component).

The following research question guided this study:

Does it exist Is there a significant difference between the academic achievement of deaf students of primary school age who learn English using SSS compared to those who do not use the multimodal communicative technique?

The main research question implies the following scientifically based assumptions:

H01: The difference between the mean levels of knowledge and use of words by deaf children placed in contrasting experimental conditions (using/not using SSS) will not be distinguished at a high value of significance.

H02: The difference between the mean levels of knowledge and use of grammatical constructions by deaf children placed in contrastive experimental conditions (using/not using SSS) will not be distinguished at a high value of significance.

H03: The difference between the mean levels of knowledge and use of the pragmatic component by deaf children placed in contrasting experimental conditions (using/not using SSS) will not be distinguished at a high value of significance.

Sampling method and research ethics

Random sampling was used for this study. The sample was made of 32 Bulgarian children aged from 9 to 11 years (Table 1).

Table 1. Demographic characteristics of the participants

		Frequency	%
Age	9 years old	13	40.62
	10 years old	10	31.25
	11 years old	9	28.13
Gender	Male	15	56.50
	Female	17	43.50
Types of hearing aid	Hearing aids	18	56.25
	Cochlear implants	14	43.75

Note: N=32

All participants (15 boys and 17 girls) have a hearing loss of 71 to 90dB. All wore personal hearing aids (18) and cochlear implants (14). The dominant means of communication is the Bulgarian spoken and written language. Four children (12.5%), who are raised in families with D/deaf close relatives, in addition to the Bulgarian language, also use Bulgarian sign language in three modes of communicative expression: extended sign utterances; simultaneous use of signs and spoken language; signs and manual representation of words (Fingerspelling). The expressive and receptive competencies in Bulgarian Sign Language correspond to the codified language norms for grade 2 (Balkanska et al. 2020). In 28.13% (N=9) of the studied population, the use of dactyl signs (in the absence of a sign or designation of proper nouns) and isolated sign lexical units typical of everyday communication was registered. The respondents were students of second, third and fourth grade and are students in the structures of 4 general education schools on the territory of Stara Zagora, Republic of Bulgaria. The students were divided into two groups of 16 individuals. One group included those who were taught English for 14 weeks by applying SSS (treatment group), while the other group of students mastered English without using the multimodal technique (control group).

The preliminary procedure involved the preparation of forms certifying the possibility to agree or refuse to participate in the study. Letters were mailed to the parents of each child identified as a possible sample participant three weeks before the start of data collection. Full confidentiality of children's personal data was ensured.

For the purpose of the experiment, the researcher conducted a 3-month training course in British Sign Language to 4 resource teachers who then imparted their knowledge to half of the study participants over a period of 14 weeks. The resource teachers then involved these 16 children in individual sessions (3 times per week) in which the teaching of spoken English was actively supported by the use of SSS.

Instrument

The main instrument used in the study was a standardized test measuring receptive and expressive oral language skills in three categories (vocabulary, grammar, pragmatics), the items of which constituted the content of the three subtests. The expressive vocabulary subtest included 68 items for students to demonstrate knowledge of the semantic component of a word and its oral expression in a linguistic context. In the grammar subtest, 53 items were provided, for students to evaluate of morphological and syntactic rules and to construct grammatically correct sentences. The last subtest consisted of 45 items. The students were required to demonstrate their ability to use English appropriately in a variety of communicative contexts, to accurately distinguish styles and registers of communication, and to select appropriate linguistic devices. The administered test has high psychometric qualities, with internal consistency coefficient (Cronbach's alpha = 0.84), and its validity allows in-depth study of specific language skills. The high correlation coefficient between individual subtests in the test-retest, ranging from 0.72 to 0.91, showed high reliability, which is evidence of stable and consistent measurement over time.

Data Analysis

The following statistical procedures were used: a Shapiro-Wilk test to examine the normal distribution of the data sets across the three linguistic categories; Descriptive statistics to classify the data and obtain summary features for individual variables across the entire sample; a statistical technique One-way MANCOVA (an extension of ANOVA) to assess statistical differences in posttest scores across the three linguistic domains between treatment and control groups, controlling for pretest means for each of the three dependent variables. The assumed level of significance was α=0.05. The empirical data were processed with the statistical package SPSS 16.0.

Research Results

Firstly, the variables verified by data screening were the linguistic test values for (a) lexical knowledge; (b) grammatical knowledge, (c) pragmatics before and after SSS application. The results of the applied Shapiro-Wilk test of normality showed

a normal distribution of the data from the three study domains in the two groups, due to p-values not significantly greater than 0.05.

The next step of the analysis involved calculating the descriptive statistics of the dependent variables. Table 2 illustrates the mean values measuring the central tendency, and the fixed SD provide information of the degree of deviation of individuals from the mean value of the respective variable.

The highest mean values were recorded for vocabulary knowledge (M=92.78 at pretest; M=93.67 at posttest), followed by the mean values of grammatical knowledge (M=90.5 at pretest; M=92.05 at posttest). The lowest score belongs to the linguistic category of pragmatics (M=89.35 at pretest; M=89.54 at posttest). Among the variables examined, the greatest distance from the mean was observed for mastery of the grammar component (SD=12.445 at pretest; SD=12.971 at posttest). Such SD indicates a relatively high degree of variability in the respondents' grammar skills. Accordingly, the least deviation from the mean was recorded in the pragmatics domain (SD=5.567 at pretest; SD=5.763 at posttest).

Table 2. Results of descriptive statistics for the three dependent variables relating to the whole sample

Period	Variable	*M*	*SD*	Minimum	Maximum
Pretest	Word knowledge	92.78	9.475	77	111
	Grammar knowledge	90.5	12.445	71	113
	Pragmatics	89.35	5.567	69	111
Posttest	Word knowledge	93.67	9.1932	78	111
	Grammar knowledge	92.05	12.971	71	113
	Pragmatics	89.54	5.763	69	111

Note: $N = 32$; *M* – mean; *SD* – standard deviation

A significant main effect of the multimodal communicative technique on performance on the three language subtests was found using an applied One-way MANCOVA statistical model: F (3. 22) =3.59, p =.03, partial η2 =.33, at a significance level of p<.05. These results could be related to each of the three hypotheses (Table 3).

Table 3. Marginal Means for Each Group and Pairwise Comparisons

Dependent variable	Group	M	SE	95% CI		Mean difference	p
Word knowledge	Control	92.89	0.35	92.17	93.56	1.37	0.01
	Treatment	93.61	0.32	93.65	94.88		

Grammar	Control	90.52	0.72	89.03	92.05	2.81	0.02
	Treatment	93.35	0.68	92.01	94.73		
Pragmatics	Control	89.53	0.18	89.02	89.76	0.01	0.94
	Treatment	89.54	0.16	89.11	89.71		

Note: *M* – mean; *SE* – standard error; *CI* – confidence interval

Null Hypothesis One. According to this hypothesis, the difference between the mean levels of knowledge and use of words by deaf children placed in contrasting experimental conditions (using/not using SSS) will not be highly significant. The statistical model identified a significant effect of the multimodal technique on vocabulary knowledge: $F(1.29) = 7.52$, $p < .001$, partial $\eta 2 = 0.24$. Comparative analysis of the means of the two groups showed that respondents in the treatment group had significantly higher academic achievement (M=93.61, SE=0.32) in the vocabulary subtest compared to those in the control group (M=92.89, SE=0.35). This suggested the rejection of the first null hypothesis.

Null Hypothesis Two. The second hypothesis postulated that the difference between the mean levels of knowledge and use of grammatical constructions of deaf children placed in contrasting experimental conditions (using/not using SSS) will not be highly significant. The significant effect of the multimodal communicative technique was also evident with respect to the grammatical component: $F(1.29) = 6.29$, $p = .02$, partial $\eta 2 = 0.21$. Comparatively, the treatment group realized significantly higher values (M = 93.35, SE = 0.68) in the grammar subscale than the control group (M = 90.52, SE = 0.72). Thus, the condition for rejecting the second null hypothesis was met.

Null Hypothesis Three. Hypothesis three was in relation to the claim of no statistically significant difference between the mean levels of knowledge and use of the pragmatic component of deaf children placed in contrasting experimental conditions (using/not using SSS). In contrast to the previous linguistic categories, the statistical model applied revealed no significant effect of the communicative intervention on the pragmatic subtest scores: $F(1. 29) = .01$, $p = .94$, partial $\eta 2 = 0.00$. Comparison of group means (treatment: M = 89.54, SE = 0.16 and control: M = 89.53, SE = 0.18) showed approximately similar performance in this domain. Therefore, the third null hypothesis could not be rejected.

During the course of the study, some advantages of cochlear implants over conventional hearing aids were highlighted. A statistically significant difference ($p < .05$) between children using different technical means to improve auditory perception was identified in the lexical domain ($p = .023$). Better achievements were also recorded at the grammar level ($p = .137$), although they did not have a statistically significant effect ($p > .05$). The results were similar ($p > .05$) regarding the pragmatic component ($p = .712$).

Discussion

The focus of the study was to establish the extent to which primary school age deaf children in the mainstream setting were able to improve their academic performance in English through the use of SSS technique. Impressive and expressive language skills in the three domains: lexical, grammatical and pragmatic were observed and assessed over a period of 4 weeks. The students underwent a pretest, after which 16 of them, forming one group, were subjected to a 14-week communication intervention and a posttest. A randomized control group pretest-posttest research design was applied in the study due to the allocation of participants into two groups placed in different experimental conditions in the school environment. Three hypotheses were formulated and tested.

The content of the first hypothesis corresponded with the knowledge and use of words and phrases in English. In this domain, a significant difference was identified between the performance of deaf students using SSS in mastering the vocabulary component compared to those who did not use the communicative technique. Their language skills were superior to those of their peers. At the lexical level, the null hypothesis concerning the difference between treated and control group was rejected. The result found was not surprising given research containing strong evidence for the effective support of SSS in the acquisition of spoken English (Marschark et al. 2005; Coryell & Holcomb 1997). Apparently, when acoustic information was unavailable or misperceived by the children, the teacher's simultaneous production of spoken words and signs provided them with additional verbal cues that compensated for missed linguistic elements or provided implicit reassurance of correctly perceived acoustic information. Using SSS at the word level allows students to enrich their English vocabulary almost as successfully as their hearing peers (Blom & Marchark 2015). Such results would encourage teachers in implementing innovative practices and techniques to improve their effectiveness in teaching English to deaf students enrolled in the general education system. Alongside the supporting evidence, it should be noted that some comparative studies have found evidence of better developed language skills in students taught using spoken language (Geers & Moog 1992). Despite the opposing positions shared by researchers regarding the benefits of teaching spoken English to deaf students through the use of SSS, the combination of sensory modalities can prove extremely valuable for most deaf students. In support of this claim is the evidence from studies on the dominant role of visual and auditory modality in language comprehension (Barsalow 1999; Meteyardet et al. 2012; Vincent-Lamarre et al. 2016). In a number of behavioral and neuroimaging studies, it is evident that visual and auditory areas in the cerebral cortex are activated during word meaning decoding (Meteyard et al. 2008; Pulvermuller & Hauk 2005; Zwaan et al. 2002). A very recent study has also crystallized irrefutable evidence for the combination of spoken words and signs as a reliable way to improve the quality of lexical representation in deaf children (Hermans et al. 2021).

The second hypothesis was correlated with the comprehension and production of grammatical constructions. The results obtained regarding the mastery of the grammatical component were in consonance with the results of the previous domain. A statistically significant difference was registered between the performance of the two groups of students in favour of the one in which the simultaneous communicative technique was applied in the course of learning English. They have remarkably increased their level of development of receptive and expressive skills in terms of grammatical knowledge. The data from the study of Bulgarian students is supported by the identified interrelationship and mutual conditioning between vocabulary, word formation, morphology and syntax (Mendívil-Giró 2019). Increasing the volume of lexical units in English, learning words with more complex word-formation structure, mastering the mechanisms of word-formation generates a positive effect on the acquisition of syntactic rules for combining words into phrases and sentences (Norbury et al. 2014). Because it provides additional information, SSS steps in as communicative support in the mainstream classroom. It has been established as a reliable tool with the potential for more effective processing of higher language level units and the combinations between them – a basis for the further development of linguistic competence (Luetke-Stahlman 1989). The grammatical rules and norms of spoken English were observed in the use of the four verb tenses (Present simple, Present continuous, Past simple, Future simple) and in the formation of the types of syntactic constructions (interrogative, negative, declarative). The present study corroborates earlier data derived from a study of deaf and hearing students (Schick et al. 2010). Comparative analyses indicated that deaf students taught through SSS demonstrated syntactic skills analogous to their hearing peers, and additional standardized reading tests revealed similar levels of reading competence. At the same time, it should be noted that the sentences correctly composed by the deaf students were distinguished by a more entertaining rate of production. This result is not surprising, given the effect of simultaneous use of signs and words on the production time of sentence structures identified by researchers, as well as the fingerspelling effect (Whitehead et al. 1997). Some of the sentences in the grammar subtest included object names that required to be represented by the BSL alphabet. Despite the longer timeline of the reproduced sentences due to the specificity of SSS, no violations of the grammatical rules of spoken English were recorded, which is in unison with other studies focusing on this multimodal technique (Baillargeon et al. 2002).

The third hypothesis reflects the pragmatic aspect of English language learning. Pragmatic competence implies the ability to use a foreign language appropriately in a variety of communicative contexts, to differentiate styles and registers of communication accurately, and to choose linguistic devices adequate to them (Crystal 1997). On the one hand, the achievements recorded at this linguistic level within the study contrasted with the apparent progress in the acquisition

of the lexical and grammatical layers. On the other hand, the number of communicatively correct options in the deaf students of the treatment group did not significantly exceed the number of correct answers realized by those mastering English by the traditional oral model. The lack of a statistically significant difference indicated that students did not develop additional pragmatic skills over the course of this study. An explanation for the results could be sought in the fact that children have not yet accumulated sufficient linguistic knowledge about the forms and conversational strategies for appropriate language use, they are not oriented in the social conditions that shape linguistic manner. Speech acts are defined as a specific set of speech options or strategies used by the speaker to realize a particular communicative function (Siegal 2016). In this perspective, at a deeper level, deaf children need to realize that the presence of stereotyped situations (greeting, introducing, apologizing, saying goodbye, welcoming guests, talking on the phone, etc.) that fulfill a certain communicative function necessitate communicative behavior within pragmatic norms that represent a number of tendencies or conventions in the pragmatic use of language and are typical or generally preferred in a certain linguistic community. Children would be more confident using a foreign language (English) if they had the appropriate pragmalinguistic knowledge to perform a speech act. Although this study attempts to fill the gap of research related to pragmatic foreign language acquisition by primary school-aged deaf students, it is imperative to conduct further research that could establish the effectiveness of using multimodal communicative technique.

The influence of the hearing aid method factor was not evident in a definitive way. Only one statistically significant difference was found in the lexical subtest. An explanation for the obtained results can be sought in the effect of SSS, on the one hand, and in the interaction of the factor with other significant variables such as (Balkanska 2009): age of implantation, time of use of cochlear implant/conventional hearing aid, visual speech perception skills, language environment, linguistic and cultural status of the family, etc. – on the other hand. The findings provide grounds for conducting additional analyses that will create a more global picture of the problem under study.

Conclusions and summary

The study focused on identifying the effect of SSS on the optimization of English language teaching of Bulgarian primary school age deaf children. The main emphasis was placed on the degree of mastery of the lexical, grammatical and pragmatic components of English as an L2. The results of this study contribute to expanding the research horizon regarding the application of technique that achieves a fusion of auditory, manual, oral means of communication in order to improve language performance, especially among the population of primary school-age deaf children, whose density is increasing in the mainstream school space. The findings

revealed that deaf students' use of multimodal communicative technique positively influenced their language skill development in the lexical and grammatical knowledge domains, while no significant change in academic performance was observed in the pragmatic domain. Obviously, to master this aspect, more emphasis should be placed on strategic models that have enhanced interactivity in general. Teaching such a set of strategies can be successfully used by teachers who seek to incorporate an element of pragmatics into the classroom.

In support of the axiom that no phenomenon is unambiguous, it must be admitted that relevant limitations are defined in the study. First, the study focused mainly on subjects in the primary grades (second through fourth grade), making it difficult to generalize the results to students in the upper grades (fifth through seventh grade). Second, the sample selected for the study contains a small number of statistical units (32), which may also preclude generalizable findings with a high degree of reliability. The larger sample would overcome this imperfection. Furthermore, the use of the communication technique provided for this study lasted only 14 weeks. It is quite possible that the relatively short timeframe has contributed to the lack of progress in the area of pragmatics. However, this does not negate the need to look for alternatives for the development of this specific skill, on the one hand, and to seek a detailed exploration of the potential of SSS for the development of a range of pragmatic skills, on the other.

This research is particularly encouraging for Bulgarian teachers who seek to support deaf children in mastering English in the mainstream classroom. This requires them to acquire new competences related to the use of SSS through self-education, participation in trainings, courses, exchange of personal experiences. In addition, it should be taken into account that Bulgarian Sign Language can be an excellent aid in foreign language teaching, primarily at the level of instructions, explanations, and guidelines – elements accompanying the teaching process. In terms of presenting lexical and grammatical rules, however, it is advisable to use the specific national sign language (in this case British Sign Language, BSL) as linguistic support in order to eliminate the risk of deaf children forming a misconception about the existence of a universal sign language.

Acknowledgement and funding

This study is financed by the European Union-NextGenerationEU, in the frames of the National Recovery and Resilience Plan of the Republic of Bulgaria, first pillar "Innovative Bulgaria", through the Bulgarian Ministry of Education and Science (MES), Project № BG-RRP-2.004-0006-C02 "Development of research and innovation at Trakia University in service of health and sustainable well-being", subproject „Digital technologies and artificial intelligence for multimodal learning – a transgressive educational perspective for pedagogical specialists" No. H001-2023.47/23.01.2024.

REFERENCES

ANGELOVA, TS., 2017. Psychosocial situation of development of students with sensory and motor disabilities in the general and special education. *International journal Knowledge* [online], vol. 20, no. 4, pp. 1963 – 1969.

ANDREWS, S.; MILER, B. & RAYNER, K., 2004. Eye movements and morphological segmentation of compound words: There is a mouse in a mousetrap. *European Journal of Cognitive Psychology*, vol. 16, no. 1 – 2, pp. 285 – 311. Available from: https://doi.org/10.1080/09541440340000123.

BAILLARGEON, M.; MCLEOD, A.; METZ, D.; SCHIAVETTI, N. & WHITEHEAD, R., 2002. Preservation of second formant transitions during simultaneous communication: A locus equation perspective. *Journal of Communication Disorders*, vol. 35, no. 1, pp. 51 – 62. Available from: https://doi.org/10.1016/S0021-9924(01)00066-1.

BALKANSKA, N., 2009. *Cochlear implantation in childhood – application, rehabilitation, training*. Sofia: Paradigma Press. ISBN: 978-954-326-088-1.

BALKANSKA, N.; LOZANOVA, SL.; DIONISIEVA, K., 2020. *Methodological guide for teaching Bulgarian Sign Language in preschool and primary school age*. Sofia: MON Press. ISBN – 978-954-8973-32-8.

BARSALOV, W., 1999. Perceptions of perceptual symbols. *Behavioral and Brain Sciences*, [online], vol. 22, no. 04, pp. 637 – 660.

BLOM, H. & MARSCHARK, M., 2015. Simultaneous Communication and Cochlear Implants in the Classroom? *Deafness and Education International*, vol. 17, no. 3, pp. 123 – 131. Available from: https://doi.org/10.1179/1557069X14Y.0000000045.

CRYSTAL, D., 1997. *English as a global language*. Cambridge: Cambridge University Press.

CORYELL, J. & HOLCOMB, T., 1997. The Use of Sign Language and Sign Systems in Facilitating the Language Acquisition and Communication of Deaf Students. *Language, Speech, and Hearing Services in Schools*, vol. 28, pp. 384 – 394. Available from: https://doi.org/10.1044/0161-1461.2804.384.

DANIELS, M., 2004. The effect of sign language on hearing children's language development. *Communication Education*, no. 43, pp. 291 – 298.

DERMENDZHIEVA, S. & TSANKOV, N., 2022. Transgressive core of multi-modal education. *International Journal of Cognitive Research in Science, Engineering and Education* (IJCRSEE), vol.10, no. 3, pp. 167 – 175. Available from: https://doi.org/10.23947/2334-8496-2022-10-3-167-175.

GEERS, A. E. & MOOG, J. S., 1992. Speech perception and production skills of students with impaired hearing from oral and total communication education settings. *Journal of Speech, Language, and Hearing Research*, vol. 35, no. 6, pp. 1384 – 1393. Available from: https://doi.org/10.1044/jshr.3506.1384.

HERMANS, D.; VAN BERKEL-VAN HOOF, L. & KNOORS, H., 2021. Vocabulary learning in children with cochlear implants in signed and spoken modalities. In: EASTERBROOKS, S.R. & DOSTAL, H.M. (Eds.). *The Oxford handbook of deaf studies in literacy*, pp. 111 – 125. Oxford: Oxford University Press.

KELLY, S. D.; MCDEVITT, T. & ESCH, M., 2009. Brief training with co-speech gesture lends a hand to word learning in a foreign language. *Language and Cognitive Processes*, vol. 24, pp. 313 – 334.

KREIMEYER, K. H.; CROOKE, P.; DRYE, C.; EGBERT, V. & KLEIN, B., 2000. Academic and Social Benefits of a Co-Enrolment Model of Inclusive Education for Deaf and Hard-of-Hearing Children. *Journal of Deaf Studies and Deaf Education*, [online], vol. 5, no. 2, pp. 174 – 185.

LUETKE-STAHLMAN, B., 1989b. Documenting syntactically and semantically incomplete bimodal input to hearing-impaired subjects. In: C. AKAMATSU & D. STEWART (Eds.). *The Journal of Deaf Studies and Deaf Education*, vol. 3, no. 4, pp. 302 – 319. Available from: https://doi.org/10.1093/oxfordjournals.deafed.a014358.

MARSCHARK, M.; SAPERE, P.; CONVERTINO, C. & SEEWAGEN, R., 2005. Access to Postsecondary Education through Sign Language Interpreting. *The Journal of Deaf Studies and Deaf Education*, vol. 10, no. 1, pp. 38 – 50. Available from: https://doi.org/10.1093/deafed/eni002.

MCFADDEN, D. Z., 1999. Total communication in the classroom. *The Hearing Journal* [online], vol. 52, no. 1, pp. 242 – 248.

MENDIVIL-GIRÓ, J. L., 2019. If everything is syntax, why are words so important? An a-morphous but non-lexicalist approach. *Linguistics*, vol. 57, no. 5, pp. 1161 – 1215. Available from: https://doi.org/10.1515/ling-2019-0025.

METEYARD, L.; CUADRADO, R.; BAHRAMI, B. & VIGLIOCCO, G., 2012. Coming of age: A review of embodiment and the neuroscience of semantics. *Cortex*, vol. 48, no. 7, pp. 788 – 804. Available from: https://doi.org/10.1016/j.cortex.2010.11.002.

METEYARD, L.; ZOKAEI, N.; BAHRAMI, B. & VIGLIOCCO, G., 2008. Visual motion interferes with lexical decision on motion words. *Current Biology*, vol. 18, no. 17, pp. R732 – R733. Available from: https://doi.org/10.1016/j.cub.2008.07.016.

NOGUERA, I.; GUERRERO, A. E.; PEYTCHEVA-RORSYTH, R.; YOVKOVA, B., 2018. Perceptions of students with special educational needs and disabilities towards the use of e-assessment in online and blended education: Barrier or aid? *Proceedings of the 12th International Technology, Education and Development Conference*, pp. 817 – 828.

NORBUI, C. F.; GEMMELL, T. & PAUL, R., 2014. Pragmatics abilities in narrative production: A cross-disorder comparison. *Journal of Child Language*, vol. 41, no. 3, pp. 485 – 510. Available from: https://doi.org/10.1017/S030500091300007X.

PULVERMULLER, F. & HAUK, O., 2005. Category-specific Conceptual Processing of Color and Form in Left Fronto-temporal Cortex. *Cerebral Cortex*, vol. 16, no. 8, pp. 1193 – 1201. Available from: https://doi.org/10.1093/cercor/bhj060.

SAEVA, S., 2022. *Total Communication*. Blagoevgrad: South-West University Neofit Rilski Press. ISBN: 978-954-00-0312-2.

SCHICK, B.; MARSCHARK, M. & SAPERE, P., 2010. The development of American Sign Language and manually coded English systems. *Oxford handbook of deaf studies* [online], vol. 1, pp. 229 – 240.

SIEGAL, J., 2016. Pragmatic activities for the speaking classroom. *English teaching forum*, [online], vol. 1, no. 54, pp. 12 – 17.

VINCENT-LAMARRE, P.; MASSÉ, A. B.; LOPES, M.; LORD, M.; MARCOTTE, O. & HARNAD, S., 2016. The latent structure of dictionaries. *Topics in cognitive science*, vol. 8, no. 3, pp. 625 – 659. Available from: https://doi.org/10.1111/tops.12211.

WERNER, D., 1987. Disabled Village Children: *A Guide for community health workers, rehabilitation workers and families.* Hesperian Foundation.

WIJKAMP, I.; GERRITSEN, B.; BONDER, F.; HAISMA, H. & VAN DER SCHANS, C., 2010. Sign-Supported Dutch in children with severe speech and language impairments: a multiple case study. *Child Language Teaching and Therapy*, vol. 26, pp. 273 – 286. WHITEHEAD, R. L.; SCHIAVETTI, N.; WHITEHEAD, B. H. & METZ, D. E., 1997. Effect of sign task on speech timing in simultaneous communication. In: SCHIAVETTI, N., WHITEHEAD, R. & METZ, D. (Eds.). *The Journal of Deaf Studies and Deaf Education* [online], vol. 9, no. 3, pp. 286 – 304.

WOODHOUSE, L.; HICKSON, L. & DODD, B., 2009. Review of visual speech perception by hearing and hearing-impaired people. *International Journal of Language and Communication Dis-*

orders, vol. 44, pp. 253 – 270. Available from: https://doi.org/10.1080/13682820802090281.

YOVKOVA, B.; PEYTCHEVA-FORSYTH, R., 2019. Factors affecting the attitude of university professors towards the use of electronic resources in the education of disabled students. *AIP Conference Proceedings,* pp. 1 – 8 [viewed 11 January 2023]. Available from: https://doi.org/10.1063/1.5133518

ZWAAN, R. A.; STANFIELD, R. A. & YAXLEY, R. H., 2002. Language comprehenders mentally represent the shapes of objects. *Psychological Science*, vol. 13, no. 2, pp. 168 – 171 Available from: https://doi.org/10.1111/1467-9280.00430.

✉ **Dr. Diyana Georgieva, Assoc. Prof.**
ORCID iD: 0000-0001-5324-930X
Faculty of Education
Trakia University
Stara Zagora, Bulgaria
E-mail: diana.georgieva@trakia-uni.bg