Pedagogical Problem Faced by Teachers in Communication and Language Learning for Deaf Students in Special Schools

Munawir Yusuf[1](✉), Fery Adriyanto[2], Priyono Priyono[1], and Abdul Rahman[1]

[1] Faculty of Teacher Training and Education, Research Center for Disability, Universitas Sebelas Maret, Surakarta, Indonesia
munawiryusuf@staff.uns.ac.id

[2] Faculty of Engineering, Research Center for Disability, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract. One of the pedagogical problems encountered by Special School (SLB) Teachers in teaching deaf students is the difficulty in teaching communication and language skills. Deaf students, especially those who are just learning in early grades of elementary school, faced three problems, namely not being able to hear, not being able to pronounce words verbally, and also not understanding sign language. It is not easy for teachers to teach communication skill and language ability to deaf students. Therefore, it is necessary to find a solution, by identifying the teachers' pedagogical problems in teaching deaf students. The purpose of this study was to identify the pedagogical problems faced by special school (SLB) teachers in teaching communication skill and language ability for deaf students. This research is a survey research at SLBN Semarang, SLBN Purbalingga, and SLB Swasta YRTRW Surakarta involving 33 teachers as research subjects who were selected purposively, namely SLB teachers who have direct experience in teaching in a class for deaf students. Data collection used semi-closed and semi-open questionnaires. The collected data were analyzed descriptively and qualitatively. The results showed that (1) the pedagogic competence of the special school (SLB) Teachers was fairly adequate, (2) the acquisition of pedagogic competence was obtained from college, training and peers, (3) the learning method used was Komtal, (4) all Teachers had experienced and sometimes still experience difficulties in learning with Deaf students, (5) the ways to overcome difficulties are through training and internship, and (6) the need for assistive technology is in the very high category.

Keywords: Pedagogical problem · Communication and Language Learning · Deaf Student

1 Introduction

Learning for Deaf students in the early grades of Special Elementary School (*SDLB*) is felt the hardest by the teachers compared to learning for non-Deaf students with special

© The Author(s) 2023
I. Ifdil (Ed.): PSSHERS 2021, ASSEHR 690, pp. 15–27, 2023.
https://doi.org/10.2991/978-2-494069-33-6_3

needs. This expression was obtained by the researchers when they made a visit to several Special Schools (*SLB*) in Central Java Province in June 2021. The main problem faced by teachers in special schools with deaf students is in terms of communication and language ability between teachers and deaf students, and vice versa. In early grades, deaf students faced three main problems, namely unable to hear, unable to pronounce words verbally, and also not understanding sign language. Deaf students are very poor in vocabulary, and slow in adding new vocabulary. As a result, communication between deaf and non-deaf and vice versa, even between teachers and deaf students, does not occur naturally and encounters many obstacles. In this context, pedagogical problems arise for teachers in teaching communication and language ability for deaf students in special schools (*SLB*). It is necessary to find a solution to overcome the teachers' difficulties in teaching deaf students. This study aims to identify pedagogical problems faced by teachers in the field, especially in the learning of communication skills and language ability for deaf students. Donald F. Morees in Somad and Herawati (2016) defines Deaf students as a general term which indicates hearing difficulties from mild to severe, classified into deaf and hard of hearing. A person who has a hearing impairment, even though the level varies in capturing sound, will be said to be a deaf student. Deaf students are gradual, ranging from mild to severe and even profound. For deaf students who do not allow their spoken language skills to be fostered and developed, other alternative languages are available, such as: sign language, sign system and total communication.

This study uses the term Deaf (*Tuli*, not *Tunarungu*). The use of the term *Tuli* in this study refers to the views of the Indonesian Sign Language Center (Pusbisindo). The term Deaf Students (*Siswa Tuli*) in the Deaf community is considered inappropriate. According to Pusbisindo, the term Deaf Students (*Siswa Tuli*) does not describe the actual situation, because the term *Tunarungu* is a medical term to describe the limitations of a hearing function from mild to severe. The term Deaf (*Tuli*) is a cultural term or a different way of communicating between Deaf (*Tuli*) and hearing (*rungu*). The term *Tuli* (Deaf) does not describe hearing impairment, but rather refers to a way of communicating. Therefore, the use of the term *Tuli* (Deaf) is recommended because it is considered more appropriate. Even according to Michele, a sign language teaching staff at the Indonesian Sign Language Center (Pusbisindo) in an article on difabel.tempo.com, the term *Tuli* (Deaf) is considered more polite than the term *Tunarungu.*

Not all Deaf are born from Deaf families. Most of them were born and raised in a normal family environment. Research data shows that about 91.5% of deaf children are born in families where all members are normal (Gallaudet Research Institute, 2001; Ray 2014). The main problem faced by family members is the different ways of communicating with Deaf children. Differences in the way of communicating can hinder interaction with other individuals. According to Blose & Joseph (2017), communication interaction between deaf and hearing individuals is a complex process, due to the unavailability of a common form of communication and understanding between both communication partners. Most (in Blose & Joseph, 2017) stated that communication as a social process and any disruption or obstacle in this communication process will have a major impact on interactions with other individuals, including with relatives, peers, or even with teachers at school and vice versa. This condition can trigger the emergence of cognitive distortions, namely the thought that the deaf individuals are the center of

attention from others, become very sensitive to criticism from others, thin that they are unique, and even feel that they are extraordinary. This condition on the one hand can increase self-esteem and self-importance, but on the other hand it can also make them difficult to manage because they feel that their behavior is a natural thing. (Elkind, 1994; Berk, 2003; Pramadani, 2016).

According to Kirk in Martin et al (2015), Hearing loss experienced by a person can vary depending on the degree of auditory acuity, which is divided into several levels whose grouping can be classified based on the time and location of the deafness. Kirk in (Martin et al., 2015) reveals that children who are born with hearing impairment or hearing loss before language and speech are formed, are called pre-lingual deaf children, this tends to be included in the category of severe deafness. Meanwhile, if deafness is experienced after the children understand a conversation or language and the speech has been formed, it will tend to be in the moderate or mild category. This is in line with Skinner and Shelton (in Effendi, 2006) who stated that deafness that occurs based on time is divided into two, namely Congenital or deafness that occurs before the child is born (prenatal) and at birth (natal) and Acquired is deafness that occurs when the child is born (post-natal) and begin to perform developmental tasks. Hearing loss levels are described (Clark, 1981) in the *Article Type, Degree and Configuration of Hearing Loss* in decibels (dB) with the categories normal, slight, mild, moderate, moderate severe, severe, and profound.

According to Effendi (2006), there are two characteristics of the obstacles encountered by the deaf, namely the difficulty in receiving all sound stimuli around them and as a result they will have difficulty in producing sounds or language sounds. This can directly affect the ability of deaf children in language and speaking. Children who are born deaf will have difficulty going through the phases of language and speech development due to the absence of feedback on their own voice and the attention of people around them. Therefore, the deaf have poor vocabulary, difficulty in interpreting language expressions that contain figurative or satire meanings, difficulty in interpreting abstract words such as the word God, clever, impossible, etc., and difficulty in mastering rhythm and style of language (Sastrawinata, 1979; Effendi, 2006).

Stoneman and Brody (in Bat-Chava, 2002) explain that another factor that affects the communication skills of the deaf is the use of hearing aids. Device (use of hearing aids vs. cochlea implants), according to parent reports, children who use cochlea implants as hearing aids experience a more positive increase in sibling relationship than children who use hearing aids, however, no significant difference was found related to the comparison of the two in relation to the hearing individuals (Bat-Chava, 2002).

The main problem of the Deaf people is communication. Deaf fellows generally use sign language, but when communicating with non-Deaf people, they need an interpreter. In everyday life, it is not possible to always have a translator available. Therefore, it is necessary to develop assistive technology that can facilitate communication and language-speaking between Deaf and non-Deaf and vice versa. To develop the appropriate assistive technology in order to help the effectiveness and efficiency of communication and language between the Deaf and non-Deaf and vice versa, it is necessary to identify the problems faced by Special School (*SLB*) Teachers in field.

The pedagogic problems of SLB teachers for deaf students involve many things, including the problem of Teacher's competence, how the competence is, how the competence is acquired, and how the efforts are made by teachers in order to improve their competence. The next problem is the level of difficulty faced by teachers in teaching Deaf students and how to overcome these difficulties, as well as the level of Teacher's need for assistive technology innovation.

2 Research and Methods

This research was conducted in several public and private special schools (*SLB*) in Central Java province consisting of SLB N Semarang, SLB N Purbalingga, and SLB B YRTRW Surakarta. This research is a survey research involving 33 teachers as research subjects. The sample selection technique used a purposive sampling technique, that is, only SLB Teachers who have been directly involved with the Deaf in conducting learning activity, and had a working period of more than one year. The data collected included 6 (six) types of data, namely (1) teacher's pedagogical competence, (2) the process of acquiring competency, (3) communication methods used by teachers, (4) problems faced by teachers, (5) efforts made in overcoming problems, and (6) the need for assistive technology. The data collection technique used a semi-open questionnaire, with 18 closed questions and 2 open questions. The results of validity test and reliability test of the measuring instrument (questionnaire) are in the high category above the specified minimum limit. Data were analyzed descriptively and qualitatively.

3 Research Findings

Table 1 describes the profile of the research respondents, as many as 33 teachers consisting of 31 women and 2 men. There are 8 teachers who are < 30 years old, 10 people aged 30–40 years old and 15 people over 40 years old. Reviewing their educational background, as many as 28 people (85%) are Special Education graduates (S1 PLB) and the remaining 5 respondents are non-Special Education graduates (15%). The tenure of the teachers in the special schools is also different, there are 21 teachers (63%) with more than 10 years of service, 5 teachers (15%) with 5–10 years of service and 7 teachers (21%) with less of five years. The employee status of the respondents is Civil Servant (ASN) with 21 teachers (63%) and Non-Civil Servant (Non ASN) with 12 teachers (36%).

Based on Table 2, it can be seen that the level of pedagogical competence in communicating and speaking with the Deaf are mostly in the category of fairly adequate (60%), followed by adequate (30%), very adequate (6%) and less adequate (3%).

Based on Table 3, it is known from the three schools that became the research locations that although most teachers felt they had communication and language competence, there were still a few teachers (15%) who did not yet have the competence to communicate and speak with Deaf students.

In Table 4, the teacher's pedagogical competence in communicating with the Deaf is mostly obtained from independent learning with peers (32%), followed by training (24%) and the rests are (22%) from college and (22%) self-taught.

Table 1. Respondent profiles

No	Information	Category	Vol.	%
1	Sex	Male	2	7%
		Female	31	93%
2	Age	< 30 years	8	24%
		30–40 years	10	30%
		> 40 years	15	45%
3	Education	S1 PLB (Special Education graduates)	28	85%
		S1 Non PLB (Non-Special Education graduates)	5	15%
4	Experience	< 5 years	7	21%
		5–10 years	5	15%
		> 10 years	21	63%
5	Staff status	ASN (Civil Servant)	21	63%
		Non ASN (Non- Civil Servant)	12	36%

Table 2. Teacher's Pedagogical Competence Level in communicating with the Deaf

No	Category	Frequency	%
1.	Very adequate	2	6%
2.	Adequate	10	30%
3.	Fairly adequate	20	61%
4.	Less adequate	1	3%
5.	Inadequate	0	0
	Total	33	100%

Table 3. Numbers of Special School Teachers who are competent in communicating with the Deaf

No	Numbers of SLB teachers who are competent in communicating with the Deaf	Freq.	%
1	All teachers	11	33%
2	Most of the teachers	17	52%
3	Few teachers	5	15%
4	None	0	0
	Total	33	100%

Table 4. Process of Acquiring Pedagogical Competence in Communicating with the Deaf for Special School (*SLB*) Teachers.

No	Process of Acquiring Pedagogical Competence in Communicating with the Deaf for Special School Teachers	Freq.	%
1	College	14	22%
2	Special Training	15	24%
3	Independent learning with peers	20	32%
4	Self-taught	14	22%
5	Others	0	0
	Total	63	100%

Table 5. Number of teachers who have attended special training in communicating with the Deaf for Special School Teachers

No	Number of teachers who have attended special training in Communicating with the Deaf for Special School Teachers	Freq.	%
1	Attended	24	73%
2	Never attended	9	27%
	Total	33	100%

Table 6. Types of Communication/Language Training Attended by Special School (*SLB*) Teachers

No	Types of Communication/Language Training attended by Special School Teachers	Freq.	%
1	BISINDO Training	8	20%
2	SIBI Training	8	20%
3	Komtal/MMR Training	21	54%
4	Others	2	5%
	Total	39	100%

Note: More than one answer choice

Table 5 reveals that there are 24 teachers (73%) who have attended special training in communicating with the Deaf and 9 teachers (27%) who have never attended special training in communicating with the Deaf. From these data, it can be concluded that more than half of the number of teachers have attended special training in communicating with the Deaf.

The type of communication/language training attended by the Special School (*SLB*) Teachers was Komtal/MMR training with 21 teachers (54%), BISINDO training with 8

Table 7. Frequency of Teacher Participation in Communication/Language Training

No	Frequency of Teacher Participation in Communication/Language Training for the Deaf	Freq.	%
1	Once	17	52%
2	2 – 3 times	13	39%
3	4 – 5 times	1	3%
4	> 5 times	2	6%
	Total	33	100%

Table 8. Choice of Communication/Language Methods Used by Teachers in Special Schools

No	Choice of Communication/Language Methods Used by Teachers in Special Schools	Freq.	%
1	SIBI Method	4	12%
2	BISINDO Method	2	6%
3	Komtal Method	25	76%
4	MMR	1	3%
5	Others	1	3%
	Total	33	100%

teachers (20%), and SIBI training with 8 teachers (20%). Based on the data in Table 6, it can be concluded that the type of Komtal/MMR training is the most attended training by Special School teachers.

From Table 7, it can be seen that 17 teachers (59%) attended communication training once, 13 teachers (39%) attended training 2–3 times, and the remaining 3 teachers (9%) attended more than 4 trainings (Table 8).

The most frequently used communication/language method by teachers in SLB is Komtal method by 25 teachers (76%). Furthermore, the SIBI method is used by 4 teachers (12%), and Bisindo is used by 2 teachers (6%). Meanwhile, the MMR (Maternal Reflective Method) is only used by 1 teacher (3%) (Table 9).

Some of the teachers' reasons for choosing the method of communication/language used by Teachers in Special Schools are because they are easy to understand (56%) and have been used for a long time/school policy (38%).

From Table 10, it is known that only 58% of schools implement policies in the use of methods for communicating with the Deaf, while 49% of schools give freedom to teachers in choosing communication methods for teaching the Deaf. The types of methods that have become school policies to be used in communication and language learning are the Komtal/MMR method with 65%, and SIBI with 24%, and 8% for Bisindo (see Table 11 and Table 12).

Table 9. Teachers' reasons for choosing the communication/language method used by teachers in special schools

No	Teachers' reasons in choosing the communication/language method used by teachers in special schools	Freq.	%
1	Easy to understand	18	56%
2	Have been used for a long time/school policy	12	38%
3	The only method understood	0	0
4	Others	2	6%
	Total	32	100%

Table 10. School Policies in the Use of Communication Methods

No	School Implements Policy on Communication Method	Freq.	%
1	Implemented	19	58%
2	Never implemented	14	42%
	Total	33	100%

Table 11. Types of Communication Methods that become School Policies to be applied in Learning

No	Types of Communication Methods that become School Policies to be applied in Learning	Freq.	%
1	SIBI Method	9	24%
2	BISINDO Method	3	8%
3	Komtal/MMR Method	24	65%
4	Others	1	3%
	Total	37	100%

There are 21 Teachers (64%) who claim that their students are able to easily understand the communication methods used by the teachers in learning, but there are still 12 Teachers (36%) who claim that their students are able to understand a little. This means that teachers who admit having difficulty in conducting teaching and learning activity with the Deaf children are still relatively large (36%). This finding is reinforced by the results of the study in Table 13 that almost all teachers (90%) have and sometimes experience difficulties in applying the method of communicating with the Deaf, only (9%) have never experienced difficulties.

Table 12. Students' Comprehension of Communication Methods Used by Teachers in Learning

No	Students' Comprehension of Communication Methods Used by Teachers in Learning	Freq.	%
1	yes, can easily understand	21	64%
2	slightly understand	12	36%
3	barely understand	0	0
4	do not understand	0	0
	Total	33	100%

Table 13. Difficulties in Applying Communication Methods during Teaching and Learning Activities (*KBM*) with Deaf children

No	Difficulties in Applying Communication Methods during Teaching and Learning activities (*KBM*) with Deaf children	Freq.	%
1	Never	3	9%
2	Rarely	14	42%
3	Sometimes	16	48%
4	Often	0	0%
5	Always	0	0%

Table 14. Availability of special training for Deaf Students

No	Availability of special training for Deaf Students	Freq.	%
1	Available	12	36%
2	Not Available	21	64%
	Total	33	100%

Efforts to Solve Problems

Effort done by schools to overcome the problems faced by Teachers and Deaf Students.

Teachers who do not have communication competency, can make several efforts to improve teacher's competence, namely organizing communication method training and internships. From Table 14, it is known that there are 12 teachers (36%) who took special language training for the Deaf. Meanwhile, from the Teacher's side, the efforts made by the school are special training (57%) and internships (24%). In the Table 15. The results of a qualitative exploration on the teacher's efforts to overcome this problem involved many efforts including asking deaf children to repeat their own sign language and then

Table 15. Efforts Done by Schools to Overcome Problems

No	Efforts Done by School to Overcome Problems on Teachers who Do Not Have Competency	Freq.	%
1	Training	24	57%
2	Internship	10	24%
3	None	5	12%
4	Others	3	7%
5	Total	42	100%

Table 16. Level of need for assistive technology for Special School Teachers

No	Level of need for assistive technology for Special School Teachers	Freq.	%
1	Highly needed	13	39%
2	Needed	20	61%
3	Rarely needed	0	0
4	Not needed	0	0
	Total	33	100%

correcting their language, teaching the students individually and communicating not only with children but also with all parties such as their peers, teachers and parents.

Level of Need for Assistive Technology to Help Teachers Communicate with Deaf Students

To overcome the problems faced by Teachers in communicating with the Deaf, assistive technology is offered. From Table 16, it is known that the level of need for assistive technology for Special School (*SLB*) Teachers is in the category of needed (61%) and highly needed (39%). This means that all SLB teachers need assistive technology to support smooth communication between teachers and the deaf in learning.

4 Discussion

This research found a lot of interesting things. Among them are the level of competence of special school (*SLB*) teachers in communication and language learning, which is in the category of fairly adequate. Teachers' pedagogical competencies are acquired through college and training, and partly through independent study. This shows that the competencies acquired in college and additional training contribute to the formation of the pedagogical competences of special school teachers.

The next finding that is quite interesting, the choice of learning methods used in schools in communication and language learning, namely Komtal/MMR. This method

is considered the most effective because Deaf students come from diverse family environments and backgrounds (Formanika, 2014). Communication learning methods depend on the classification of Deaf levels. Students with moderate and severe levels of deafness cannot communicate verbally, hence, it is necessary to use nonverbal communication or total communication. Meanwhile, students with the classification of mild to severe deafness can still communicate with each other through face-to-face communication and body language (Mudjiyanto, 2018).

Another finding from this research is that almost all teachers have and sometimes experience difficulties in communicating and speaking with Deaf students. Efforts and solutions from schools to overcome these problems include participating in training and doing internships in other schools, as well as using assistive technology. Several studies have been conducted to develop assistive technology, namely sensor-based communication aids that can be used to solve communication problems for the Deaf (Sharma et al. 2013. Vijayalakshmi and Aarthi (2016) use a glove with fex sensor for motion recognition. Arif et al. (2016) used 5 fex sensors on the glove to translate ASL for the Deaf-mute into visual and audio output on the LCD; Ronaldo Tenório (2017) developed a Hand Talk application that translates Brazilian words into sign language via 3D Avatar display on LCD. Moreover, internet-based assistive technology has been developed, namely the use of Web Captioner, which functions as verbal language translator. Web Captioners are considered very effective in facilitating deaf individuals to learn compared to other translator tools because they have a high accuracy of 95% (American Anthropology ogical Association in Kourbetis V., Kripi., Boukouras K. (2020). This finding is in line with previous research that the development of assistive technology is needed for the Deaf and non-Deaf (Santoso et al., 2020). The use of learning media for Deaf students is an important component, considering that the media can be a learning material that can be used to communicate indirectly instead of directly. Media for children with special needs (*ABK-Anak Berkebutuhan Khusus*) is a media that need to be modified according to students' needs (Rahmah, 2018). In addition to the efforts that have been offered, several strategies must be carried out by teachers and parents to participate in facilitating the learning in communication for the Deaf even during pandemic conditions. Furthermore, Teachers should always motivate this group physically and mentally, and train them to face every challenge Krishnan et al., (2020).

5 Conclusion

This research can be concluded as follows: (1) the level of competence of Special School (*SLB*) Teachers in teaching communication skills and language ability is in the category of fairly adequate. (2) Teachers' pedagogic competence is obtained through college and training, and partly through independent learning. (3) The chosen learning methods used in schools for communication and language is Komtal/MMR instead of Bisindo and Sibi. This method is considered the most effective because Deaf students come from diverse environments and family backgrounds. (4) Almost all teachers had experienced and sometimes still experience difficulties in communicating and speaking with the Deaf. (5) Efforts and solutions from schools to overcome Teacher's problems in teaching deaf students, among others, are participating in training and doing internships in other

schools, as well as using assistive technology. (6) All SLB teachers have a very high level of need for the use of assistive technology.

References

A. Arif, S. T. H. Rizvi, I. Jawaid, M. A. Waleed, and M. R. Shakeel, "Techno-talk: An American Sign Language (ASL) Translator," in Proceedings of the 3rd International Conference on Control, Decision and Information Technologies, CoDIT 2016, pp. 665–670, April 2016.

Bat-Chava, Y., & Martin, D. (2002). *Sibling Relationships of Deaf Children: The Impact of Child And Family Characteristics. Rehabilitation Psychology 2001, 47(1)*, 73–91.

Blose ZM, Joseph LN. (2017). *The Reality of Every Day Communication for a Deaf Child Using Sign Language In A Developing Country*. Afri Health Sci. 2017; 17(4):1149–1159. https://doi.org/10.4314/ahs.v17i4.24

Clark, J. G. (1981). Uses and abuses of hearing loss classification. Asha, 23(7), 493–500.

Effendi, M. (2006). *Pengantar Psikopedagogik Anak Berkelainan.* Jakarta: Bumi Aksara

Formanika, K. (2014). Komunikasi Total Sebagai Model Komunikasi Pada Anak Tuli. *EJournal Ilmu Komunikasi*, *2*(2), 213–222

Kourbetis V., Kripi., Boukouras K. (2020) Digital Accessibility in the Education of the Deaf in Greece. In: Antona M., Stephanidis C. (eds) Universal Access in Human Computer Interaction. Application and Practice. HCII 2020. Lecture Notes in Computer Science, vol 12189. Springer, Cham.

Krishnan, I. A., Mello, G. De, Kok, S. A., Sabapathy, S. K., Munian, S., Ching, H. S., Kandasamy, P., Ramalingam, S., Baskaran, S., & Kanan, V. N. (2020). Challenges Faced by Hearing Impairment Students During COVID-19. Malaysian Journal of Social Sciences and Humanities (MJSSH), 5(8), 106–116. https://doi.org/10.47405/mjssh.v5i8.472

M. V. Sharma, N. V. Kumar, S. C. Masaguppi, S. Mn, and D. R. Ambika, "Virtual talk for deaf, mute, blind and normal humans," in Proceedings of the 2013 1st Texas Instruments India Educators' Conference, TIIEC 2013, pp. 316–320, April 2013.

Martin, L., Frehadtomo, K., Putri, Dayawati, R. N., Si, S., & Prawita, F. N. (2015). So-Ice (Sign To Voice) Aplikasi Alat Bantu Komunikasi Untuk Tuna Rungu Wicara So-Ice (Sign To Voice) Application As A Communication Tool. 1–8

Mudjiyanto, B. (2018). Pola Komunikasi Siswa Tuli di Sekolah Luar Biasa Negeri Bagian B Kota Jayapura. *Jurnal Studi Komunikasi Dan Media*, *22*(2), 151. https://doi.org/10.31445/jskm.2018.220205.

P. Vijayalakshmi and M. Aarthi, "Sign language to speech conversion," in Proceedings of the 2016 International Conference on Recent Trends in Information Technology, ICRTIT 2016, April 2016.

Rahmah, F. N. (2018). Problematika Anak Tuli Dan Cara Mengatasinya. *Quality*, *6*(1), 1. https://doi.org/10.21043/quality.v6i1.5744.

Rusyani, Endang (2019), *Sistem Komunikasi Anak Tunarungu (Siskom*), Bahan Ajar, Departemen Pendidikan Khusus, Fakultas Ilmu Pendidikan, Universitas Pendidikan Indonesia, Bandung.

Santoso, Y. B., Astuti, E. Y., Ratnawulan, T., Khoeriah, N. D., & Hakim, L. L. (2020). Development assistive technology for students with hearing impairments. *Journal of Physics: Conference Series*, *1*. https://doi.org/10.1088/1742-6596/1539/1/012042

Somad, Permanarian dan Herawati T (1996). *Ortopedagogik Anak Tuli.* Bandung. Depdikbud Direktorat Pendidikan Tinggi Jakarta.

Pramadani, A. (2016). *Pemaknaan Sibling Relationship Pada Individu Normal Dengan Saudara Penyandang Disabilitas* (Skripsi). Universitas Gadjah Mada: Yogyakarta

Ray, Elizabeth. (2014). *The Experiences Of Hearing Siblings When There Is A Deaf Child In The Family.* (Disertasi) University of Catenbury, New Zealand.

Ronaldo Tenório, "A mobile app gives deaf people a sign-language interpreter they can take anywhere". MIT Technology Review in https://www.technologyreview.com/innovator/ronaldo-tenorio/.

Winarsih, Murni. (2007). *Intervensi Dini Bagi Anak Tuna Rungu dalam Pemerolehan Bahasa.* Jakarta. Direktorat Jenderal Pendidikan Tinggi.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.