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## Sign language education in pre-school: Prospective pre-school teachers' views about the Turkish sign language course

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Pre-school education is significant in the education of deaf children. The pre-school teacher is a gateway to realising the inclusion of deaf children in schools. In this study we investigated prospective pre-school teachers' opinions and thoughts about sign language in deaf children's education. In this descriptive study we employed the qualitative research method: semi-structured interviews were conducted with 16 prospective pre-school teachers who took the elective sign language course in the fall semester of the 2018–2019 academic year. The main themes obtained from the interviews were as follows: "Quality in early childhood education", "Innovative practices in teacher training", "Inclusive education in the pre-school period", "Effective teaching for deaf children" and "Sign language competence of teachers." The research findings suggest that prospective teachers must learn sign language that would contribute to their professional competence and that they would actively use sign language in their future professional lives.

**Keywords:** deaf; pre-school education; pre-school teacher; sign language; Turkish Sign Language (TSL)

### Introduction

Ninety-two percent of deaf children are born to hearing parents (Kemaloğlu, 2015; Pistav Akmese, 2019a). Deaf children are generally academically at risk due to the lack of a language foundation (Easterbrooks, Lederberg, Antia, Schick, Kushalnagar, Webb, Branum-Martin & McDonald Connor, 2015; Humphries, Kushalnagar, Mathur, Napoli, Rathmann & Smith, 2019; Lederberg, Schick & Spencer, 2013). Cochlear implants (CI) may not assure accessible language to many deaf children. When it is realised that the deaf child does not acquire spoken language with cochlear devices, the critical period may already have passed and the child faces the risk of becoming linguistically deprived (Humphries et al., 2019). Deaf children and children with congenital hearing loss use sign language as one of the methods of communication (Kemaloğlu, 2015; Kubus, Ilkbasaran & Gilchrist, 2016; Ozsoy, 2018; Pistav Akmese, 2019a). The knowledge of sign language by the personnel involved in pre-school education is of the utmost importance to ensure that deaf children access quality education at school (Pistav Akmese, 2019a, 2019b).

Legal regulations regarding the use and popularisation of sign language in educational institutions were proclaimed in Turkey. As a result of these legal regulations, deaf children in schools for the Deaf have started to receive education in which auditory-verbal language and sign language are used together since 2015–2016. Turkish Sign Language (TSL) has been added as an elective course to all higher education programmes from the 2013–2014 academic year (Ilkbasaran, 2016; Piştav Akmeşe, 2016, 2019a). Subsequently, *TSL* by Akalın, Oral and Cavkaytar (2014), *Talking via Hands Turkish Sign Language Studies* by Arık (2016), *Turkish Sign Language Grammar Book* by Dikyuva, Makaroglu and Arık (2015) and *Turkish Sign Language in Education* by Pistav Akmese (2019a) were added to the national literature after 2014.

As the need for communication is a fundamental need in family, school and social life, teachers' knowledge and use of sign language are important for deaf children to participate in and benefit from educational processes at the maximum level (Ilkbasaran, 2016; Pistav Akmese, 2019a).

The pre-school period is of great importance for children to gain skills, knowledge, and behaviour. Every child, including pre-school children, has the right to quality education. From an early age children with disabilities, and socially disadvantaged children should receive inclusive and quality education (European Commission, 2017). For the successful implementation of policies it is important to increase the competencies of the personnel involved in the education system (Yaraya, Masalimova, Vasbieva & Grudtsina, 2018). Deaf children need much support in the pre-school period in many subjects such as sound-letter correspondences and alphabetic coding skills (Lederberg, Miller, Easterbrooks & Connor, 2014). It is the responsibility of parents at home and teachers at school to teach these skills, which lay the groundwork for the development of literacy skills in the following years (Beal-Alvarez, Lederberg & Easterbrooks, 2011). Pre-school education supports children's school readiness in early childhood (Pitt, Luger, Bullen, Phillips & Geiger, 2013).

The acceptance of deaf students in inclusive classrooms is closely related to teachers' attitudes since positive attitudes toward inclusive education are of great importance for the integration of deaf children into education.

Inclusive teachers attach importance to the diverse needs and backgrounds of their students, adopt different teaching methods, and are open to professional development (Donnelly, 2010; Muzata, 2018). According to Majoko (2019), teachers' professional competence is a key component of creating inclusive, individualised, and effective instruction. Emphasising the importance of teacher training, Franzkowiak (2009) states that to train inclusive teachers, relevant courses should be compulsory at undergraduate and graduate levels. According to Kosnik and Beck (2009), the better teachers are trained about inclusive education in the prospective teachers' education process, the more it is reflected in their teaching practice. Donnelly and Watkins (2011) point out that teachers should be properly trained in inclusive education to meet the needs of all students. Previous research has revealed the importance of both early diagnosis and intervention for deaf children. It has also been revealed that enhancing the competencies of personnel involved in the education of these children in the pre-school period was significant.

#### Literature Review

Deaf children are most disadvantaged in terms of communication, language, and speaking skills. The difficulties they experience starting from early childhood create a disadvantage in terms of, particularly, literacy skills in the primary school years (World Health Organization, 2021).

Early exposure to language is critical, starting at birth (Krentz & Corina, 2008). To ensure that children acquire communication and literacy skills, audio-verbal education or teaching sign language as mother tongue is critical from an early stage (Muzata, 2020; Wright, Hargate, Garside, Carr, Wakefield, Swanwick, Noon & Simpson, 2021). Kushalnagar, Mathur, Moreland, Napoli, Osterling, Padden and Rathmann (2010) suggest that deaf children could more effectively catch visual clues in receptive and expressive language and participate in classroom and family activities in which sign language and the auditory-verbal approach are used together. Yoshinaga-Itano (2014) reports that early intervention services, with a formative role in the communication skills of deaf children, increase children's participation in pre-school education. The author also states that positive development was observed in the vocabulary and verbal reasoning test successes of pre-schoolers who benefited from early intervention services before the age of 1 year. Special education services following early diagnosis contribute significantly to the education and social participation of deaf children (Muzata, 2020; Wright et al., 2021). Allen (2020) states that parental role-based anxiety and stress levels of parents who received social support with early

intervention studies decreased when their deaf children started pre-school education.

In Turkey, deaf children experience sign language for the first time at schools for the Deaf (except for those who have deaf parents and are exposed to sign language in the family environment) (Pistav Akmeşe, 2019a). A number of studies that show that using sign language in educational settings contributes to the language and communication skills of deaf children (Gol-Guven, 2016; Piştav Akmeşe & Kayhan, 2016). In a study investigating prospective teachers' views about the education of deaf children and the use of sign language, Piştav Akmeşe and Kayhan (2016) state that the participants suggested teaching sign language in the early childhood period and the use of sign language in inclusive schools positively contributed to both deaf children's communication with their peers with typical development, and with their academic performance. Also, it is emphasised that teachers who are expected to work with the Deaf in their future professional lives should focus on educator competencies during undergraduate education (Piştav Akmeşe & Kayhan 2016).

#### Theoretical Framework

Social interaction is important for language development. Language development is a factor that directly affects the learning process. According to Vygotsky (1962), language has two critical significances in cognitive development. Firstly, adults convey information to their children via language. Secondly, language is a very powerful mediator of cultural adaptation (McLeod, 2020). Children build communication on understanding by experiencing reality in a rich and qualified environment in terms of language development in the early period. According to Vygotsky's theory in which the social environment is emphasised, language is a tool which is understood and interpreted with experience and interaction. Knowledge is constructed cognitively and socially. For example, students construct knowledge with real experiences and social interactions at school. In social constructivism, the school with its associated experiences is a significant environment for children because learning occurs as a result of interaction with peers and teachers (Idaresit Akpan, Igwe, Mpamah & Okoro, 2020). Children learn through activities they do with adults who know more than themselves. These activities occur in the zone of proximal development (ZPD) (Topbaş, 2007). The ZPD provides the child with the opportunity to learn new skills. Adults provide the child with the help that supports the child's learning which is appropriate for his/her age, and that he/she can understand. The school environment where the child socially interacts should be a qualified and inclusive place for every child. For deaf children the school environment

should be an environment where they have qualified interaction with their peers and teachers and access accurate support. The teacher's role in the classroom based on social constructivism is to enable cooperation and to provide peer-mediated student-centred education (Idaresit Akpan et al., 2020). Another model that emphasises the environment's role was developed by Urie Bronfenbrenner.

Bronfenbrenner's ecological systems theory is one of the theories that explain the role of the environment in child development (Lindon & Brodie, 2016). According to this theory, four main layers can best explain a child's development. These are the microsystem, mesosystem, exosystem, and macrosystem layers.

The child's first environment is the family (inner-most layer – microsystem context). A deaf child's development depends on the family's ability to adapt quickly to the disability in the family. Failure to communicate not only affects the child, it affects the family as well. When families cannot communicate with their deaf children, they live a life of concern and disquiet (Allen, 2020; Paster, Brandwein & Walsh, 2009). Acceptance of the deaf child depends on the approaches in the family's immediate surrounding (mesosystem), the help received from the exosystem (the school, health, and other services), and policies that support the child (macrosystem level) (Chaudhury, 2014; Humphries et al., 2019).

Sign language is a fundamental need for a deaf child. The main concern related to this study is the policies at the macrosystems level versus the child at the exosystems level. The main emphasis is on national or local school policies that empower the sign language competence of deaf children's teachers. If a policy on how teachers can support deaf children's development and education is absent, the exosystem level in which education lies would be an area of concern. As a result of this, education would not meet the needs of the child in the school. Teachers cannot interact with the child unless their abilities are increased and they learn sign language. They cannot support the communication of deaf children with their peers and cannot create environments that support the children's language development. Children's language development is better provided for by family members and their teachers. For a deaf child, parents, pre-school teachers, and special education teachers are the ones who are directly associated with language development. Therefore, teaching pre-school teachers sign language will contribute to overcoming possible communication barriers and promote smooth interaction between the children, their peers, and pre-school teachers.

In this study we focussed on the access of deaf children to quality education, thus, on teachers' knowledge of deaf children's methods of

communication in which sign language is one such method. Sign language has been added as an elective course to all higher education programmes from the 2013–2014 academic year in Turkey. Teachers learn sign language through a 120-hour basic sign language course affiliated with the Ministry of National Education and through websites of which most provide one dictionary and some are available at a fee (Piştav Akmeşe, 2016, 2019a).

The United Nations Convention on the Rights of Persons with Disabilities plays an important role in the use of sign language and the development of TSL (Kubus et al., 2016, Piştav Akmeşe, 2019a). Accordingly, it is significant to train teachers in the language studies of deaf children as sign language is deaf children's native language. Prospective teachers should thus take sign language courses during their undergraduate education and gain competencies in using sign language. Prospective pre-school or kindergarten teachers in particular should learn sign language for use when teaching children in the pre-school period, which is a very important period for native language development. With this as a starting point, we aimed to research the opinions and thoughts of prospective pre-school teachers about sign language education.

The best way of interaction between pre-school teachers of deaf children is the use of sign language. The attainment of inclusive education can be enabled when pre-school teachers are supported with skills to support their communication and interaction with deaf children. The success of policies on inclusive education and the realisation of the rights of deaf children should also be determined by the competence of pre-school teachers in their children's education. Effective sign language training at universities depends on the age group that prospective teachers will teach. It is thought that examining prospective pre-school teachers' views about TSL education can contribute to the relevant literature on sign language education in higher education institutions.

With this study we aimed to investigate prospective pre-school teachers' opinions and thoughts about sign language in deaf children's education. Answers to the following research questions were sought in the study.

#### Research Questions

- 1) What do prospective pre-school teachers who take the elective sign language course think about supporting the language and communication skills in early childhood?
- 2) What do they think about the teaching of deaf children in the classroom?
- 3) What do they think about using sign language in pre-school education?
- 4) What do they think about using sign language and professional competence?

- 5) What do they think about the professional competencies of pre-school teachers who take the Turkish Sign Language course?

### Methodology

In this descriptive study we employed the qualitative research method, which enables an in-depth investigation of participants' opinions and thoughts. The data were obtained using an interview form consisting of 12 open-ended questions. The form was developed in line with the feedback from experts on special education, education of the Deaf and TSL education. Codes (T1, T2, etc.) were used to refer to the participating prospective pre-school teachers to ensure their anonymity and the same codes were used to code the findings.

### Study Group

The study group included 16 prospective pre-school teachers studying at the pre-school teaching department of a state university located in the Aegean region of Turkey. The participants in the research were selected through purposive sampling using the criterion sampling method.

### Data Collection

In this study we aimed to investigate the prospective pre-school teachers' opinions and thoughts about sign language education – one of the methods used in the education of deaf children.

Semi-structured interviews were conducted with 16 prospective pre-school teachers who took and graduated from the elective course in the 2017–2018 academic year. We created a question pool based on the students' experiences during their lectures. The questions were determined after having gained the opinions of three experts in the sign language field. The questions used in the face-to-face interviews with the prospective pre-school teachers are presented in Appendix A. During the interviews we took notes and recorded the semi-structured interviews.

### Data Analysis

The data obtained from the participants were analysed. Descriptive data analysis was done using the NVivo 10 program, paying attention to the details from a holistic approach.

Data analysis included preparation, organisation, and reporting stages. Data analysed in these stages were transformed into themes where conceptual structures and data were rendered into qualitative categories and turned into findings (Elo & Kyngäs, 2008).

### Preparation stage

Findings obtained from the written interview forms that had been received from the participants were put into writing in sections (descriptive index, descriptive data, interviewer comments, and page comments) and a code number was allocated to each participant (e.g., T1). The analysis stage was conducted after the data were transferred to an electronic environment. An online data list was obtained from the participants' semi-structured interviews.

### Organization stage

We first formed a conceptual framework by taking the research questions into account. Then, using the conceptual framework as a guide, we decided under which themes and categories the answers would be categorised.

The data that had been transferred to an electronic environment were organised by collating similar data under specific concepts and themes. Primarily, the descriptive data were coded. In this stage we approached the interview questions as the main themes.

### Reporting stage

Determining concepts and relations that could explain the collected data was the main objective. The findings were recorded by us and a specialist by quoting the participants' opinions verbatim to enhance persuasiveness and provide validity. The data list was transformed into writing sections (descriptive index, descriptive data, interviewer comments, and page comments from the interview form). Repeatability and intercoder reliability calculations were made to ensure reliability. Intercoder reliability analysis was conducted on the subthemes obtained (Creswell & Creswell, 2017). In this process, the reliability formula of Miles and Huberman (Reliability = [Agreement / (Agreement + Disagreement)] \* 100; 1994) was used and intercoder reliability was found to be 90%; as a result, the research was accepted as reliable.

### Findings

As a result of the analysis of the participants' views, five themes were obtained: "Quality in early childhood education", "Innovative practices in teacher training", "Inclusive education in the pre-school period", "Effective teaching for deaf children" and "Sign language competence of teachers." The themes and sub-themes developed from the data analysis are presented in Table 1.

**Table 1** Main themes and sub-themes obtained from participants' views

Main themes and sub-themes
1) <i>Quality in early childhood education</i>
1.1) Interaction opportunities among deaf children and hearing children
1.2) Contribution of sign language use in pre-school education for integration
2) <i>Innovative practices in teacher training</i>
2.1) Opinions about the effective communication opportunity with parents of deaf children in inclusive education
2.2) Opinions about an effective teaching process and preparation of IEP
2.3) Opinions about providing a cooperation opportunity with other personnel working with deaf children
3) <i>Inclusive education in the pre-school period</i>
3.1) Opinions about the quality problem in teacher training
3.2) Opinions about the approaches regarding the education of deaf children and special education field knowledge competence
3.3) Suggestions about the prerequisite knowledge and skills in sign language education
3.4) Opinions and suggestions about the teaching of sign language
4) <i>Effective teaching for deaf children</i>
4.1) Opinions about the importance of professional competence and effective teaching skills for teachers
4.2) Opinions about the suitability of sign language for increasing peer interaction in the early period and ensuring concrete learning
4.3) Suggestions for increasing the quality of in-class practices
5) <i>Sign language competence of teachers</i>
5.1) Field expertise and sign language education in higher education
5.2) Effective use of educational materials and technology skills

### Quality in Early Childhood Education

Participants were of the opinion that using sign language was important to provide interaction among deaf children (T1, T3, T4, T5, T6) and that using sign language in the pre-school period would support peer interaction (T5, T7, T13, T16). Participant T13 stated that the use of sign language should be given importance from an early age: *“Sign language use in the pre-school period is highly important. Teachers should use sign language to raise awareness in their deaf students.”*

Participant T2 stated that parents and teachers should use understandable and short sentences while talking to deaf children: *“Sign language should be used by both parents and teachers. It takes a long time to listen to deaf children.”*

As a second sub-theme, participants emphasised the importance of raising awareness in parents and school personnel about the use of sign language. They stated that all pre-school children, either deaf or hearing, payed attention to gestures, mimics, and facial expressions while communicating with their teachers. So, when sign language is used, a positive attitude can be developed in students regarding inclusive education in schools. The participants also thought that using sign language in classes would ensure that both children and parents adopted a positive attitude towards special education. An excerpt related to this finding is as follows: *“Being able to convey one’s thoughts and feelings is highly important for communication. Firstly, deaf children can feel that they are understood in a group which has sign language awareness”* (T5).

### Innovative Practices in Teacher Training

Considering participants' opinions about using sign language in pre-school education, they stated that

doing so would meet the needs of deaf children in educational environments and would contribute to the professional competencies of teachers. They also stated that learning to use sign language during undergraduate education would help teachers build effective communication with both deaf children and their parents. It was also emphasised that hearing children may have hearing-impaired or deaf parents. Thus, an effective education process should be formed in an environment in which individual differences of deaf children are taken into account. Also, doing so would contribute to the preparation of an effective individualised education plan (IEP) and a development process throughout the school by working with deaf children as a team. The participants indicated that deaf children and parents generally adopted a positive attitude towards schools where sign language was used. Another prominent finding of the study was about the effect of the communication types, language, acceptance, and supportive body language established by the parents and the adults in the early childhood period (all participants except T1, T8, T9). This theme is related to the teachers' effective communication with deaf children. Participant T2 stated that the child should see the teacher's face for lip reading and gestures and mimics in communication. Participant T2 drew attention that a high tone of voice and exaggerated gestures, and mimics should be avoided in communication; teachers should use short sentences and concrete expressions instead of long sentences: *“While using gestures and mimics, they should avoid exaggerated mouth movements to ease comprehensibility by the deaf child.”*

Participants T6 and T7 emphasised that children in the pre-school period need more concrete teaching materials: *“The teacher should*

*give clear instructions, use materials, and visual clues, and embody the lesson” (T6).*

#### Inclusive Education in the Pre-school Period

The participants who thought that an inclusive education approach should be discussed in teacher training drew attention to the problem of quality in teacher training. They indicated that the types of adaptations used to support deaf children in the education process should be in accordance with the age and school level in undergraduate teacher training programmes: *“Teachers should be aware of hearing loss before they start their profession, know the importance of eye contact, lip movements, understandable and visual clues, learning materials supported with subtitles” (T9)*

#### Effective Teaching for Deaf Children

All participants underlined that both theoretical and practical sign language courses should be included in undergraduate teacher training programmes. Participant T9 emphasised the way in which education is delivered and the competence of the pre-school teachers working in this field in higher education institutions. On this, T9 stated the following: *“Instead of following sign language courses in a single content in higher education institutions, sign language should be given 2 days a week, 1 hour a day in small groups, which allow giving feedback to each participant.”*

Participants T6, T7, T13, T14, T15, and T16 stated that it was necessary to support language development and language and communication skills of deaf children from early childhood onward: *“[the] period is highly important. Teachers should be able to communicate effectively with the child, and certainly include the child in education during this period. Thus, preschool teachers should know sign language at a sufficient level” (T14).*

Participants T6, T7, T13, T14, T15, and T16 stated that an individual’s language development and language communication skills should be supported from early childhood. Participant T14 indicated that the pre-school period was very important. During this period, teachers should be able to communicate effectively with the child and must include the deaf child in teaching, so they need to know sign language at a sufficient level.

#### Sign Language Competence of Teachers

All participants stated that students of teaching departments should receive sign language courses during their undergraduate education. They also indicated that the course credits should be increased, and that the course content should be enriched with videos, animations, and educational materials to support the use of sign language among students.

Participants T1, T4, T5, T6, T7, and T10 stated that the students of the teaching departments should take sign language lessons while continuing

their undergraduate education. They suggested that the course should be presented practically. They said that the notional hours should be increased and that the course content should be enriched with videos and animations. Participants T1 and T6 said that educational materials should be prepared to support the use of sign language among students.

#### Discussion

In the study the opinions of the participants were described under five main themes, namely, quality in early childhood education, innovative practices in teacher training, inclusive education in the pre-school period, effective teaching for deaf children, and sign language competence of teachers. The opinions of the survey participants support the following three main points:

#### Sign Language and Early Childhood Education

It is stated that deaf children face a great risk in terms of poor academic skills as a result of the difficulties they experience with language and communication (Easterbrooks et al., 2015; Mayberry, Chen, Witcher & Klein, 2011). Humphries et al. (2019), in a study discussing the questions frequently asked by parents of deaf children, emphasise the relation of sign language and early childhood education in the support process and effective and proof-based practices. They state that deaf children’s parents who learn sign language and use it in the home environment enable a less stressful and anxiety-free home environment. They also emphasise that supporting more holistic verbal language skills in communication methods provide an opportunity for children to grow up and become productive members of the Deaf society and general society in later years.

Donoghue (2014) investigated the degree to which early childhood professionals perceived early childhood language development to be impacted by sign language. The results of the study show that teachers and speech-language pathologists agreed that sign language could be beneficial to language development in children.

#### Quality of Education Services and Support Services

The participants, who emphasised the quality of education and support services stated that congenital hearing loss negatively affected children’s cognitive, social, academic, and, especially, language development in the early period, therefore, their education should be supported with games. Teacher candidates stated that the use of sign language would concretise education and that the quality of in-class practices would positively contribute to peer interaction in the early period. These teacher candidates also drew attention to the fact that social awareness

could be obtained in childhood through the use of sign language. They also emphasised that deaf children's legal rights and right to education in the pre-school period are significant for creating this awareness in the family. When families learn about their legal rights, their participation in educational services increases. The findings in our study are similar to those reported in a study on the education of deaf children conducted by Piştav Akmeşe and Kayhan (2016).

The quality of the interaction with the child and the number of staff in early childhood education are very important. When the number of teachers is sufficient, the frequency and quality of interaction between the teacher and the students increase (Organisation for Economic Co-operation and Development [OECD], 2020). According to Vygotsky, learning is a process that develops with the help of adults, and school is a significant social interaction environment. The quality of the interaction formed with the teacher is a significant indicator of learning (Idaresit Akpan et al., 2020). In quality early childhood education the teachers are closely acquainted with each child and their families, and they know how to play and work with the children. They support friendship skills and plan activities in a way that all children can participate. They include each child's family, language, and culture in in-class activities (National Association for the Education of Young Children [NAEYC], n.d.). Full participation of deaf children in pre-school education depends on the frequency and quality of the interaction between the teacher and the children. At this point, the teachers' competency in the use of sign language is determinative in the interaction with deaf children.

#### Sign Language Training of Teachers

Deaf children need to receive sign language education together with auditory, verbal education in the early period in terms of their academic and social life (Pistav Akmeşe, 2019a). Parents and pre-school teachers have a great role in the development of deaf children's language and communication. Pre-school teachers who take sign language courses during their undergraduate education are able to communicate more effectively with deaf children after completing their studies.

An important point in the use of sign language is the role of qualified teachers in developing sign language competencies (Krausneker, Becker, Audeoud & Tarcsiová, 2022). In Turkey, TSL was included in all higher education programmes as an elective course from the 2013–2014 academic year (Ilkbasaran, 2016; Pistav Akmeşe, 2019a). Teachers learn sign language through a 120-hour basic sign language course affiliated with the Ministry of National Education and through websites. However, teachers cannot demonstrate

their sign language competencies legally (Pistav Akmeşe, 2019a). They try to develop their language competencies with certificate programmes when they start working with deaf children because they do not feel competent to use sign language. All the participants in this study emphasised that the European Credit Transfer and Accumulation System (ECTS) of the course should be increased and that sign language competencies should be supported with videos, animations, and educational material. Teachers' sign language competency plays a determining role in the quality of the interaction with the deaf children at school. Thus, it is important to increase the sign language ECTS of the teachers, enrich course contents, and create criteria to determine sign language use competencies of teachers before they start educating deaf children. A teacher who knows sign language is the most important source of learning for deaf children.

#### Conclusion

In this study participants drew attention to the role of pre-school teachers in teaching sign language to deaf children at an early age. They stated that the fact that pre-school teachers know sign language contributes to effective communication and children's language skills. They emphasised the necessity that pre-school teachers of deaf children should know sign language to enhance their communication with and the learning of deaf children.

As a result, pre-school teachers need to learn communication methods to teach deaf children. Therefore, pre-school teachers must attend sign language courses during their undergraduate studies and professional life. Knowing and actively using sign language would contribute to teachers' teaching skills.

#### Suggestions

- The quality of deaf children's pre-school education should be investigated with access, participation, and support criteria.
- The frequency and quality of interaction of the pre-school teachers who teach in inclusive schools with deaf children should be investigated.
- Early intervention programmes that include both auditory-verbal language and sign language should be developed. The effectiveness of these programmes should be evaluated.
- Free mobile applications should be designed and made accessible for teachers and hearing parents of deaf children to support the early language development of deaf children. The effectiveness of mobile applications should be investigated.

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### Authors' Contributions

PPA and NK wrote the manuscript and provided data for all tables. Both authors analysed the data using computer assisted qualitative data analysis software (NVivo 10 program). Both authors contributed to the writing of the article; PPA and NK designed the semi-structured interview form. Both authors wrote the discussion of the results, findings, recommendations and conclusion. Both authors reviewed the final manuscript.

### Notes

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**Appendix A: Questions from the Semi-structured Interview Form Posed to the Teachers**

- Q-1) What do you think about the effective communication process with the children in the pre-school period?
- Q-2) What do you think about language development and communication courses of pre-school teachers in the undergraduate period? Evaluate the courses in terms of duration and content.
- Q-3) What do you think about the contribution of sign language use in the education of deaf children in the pre-school period to deaf and hearing children?
- Q-4) What do you think about sign language use in pre-school education environments?
- Q-5) What kind of arrangements should be made in the pre-school curricula for deaf children to receive education with equal opportunities with their peers?
- Q-6) Which competencies should pre-school teachers have regarding sign language?
- Q-7) What do you think about sign language teaching materials?
- Q-8) What do you think about the effect of sign language use on social participation?
- Q-9) What do you think about sign language education in higher education institutions?
- Q-10) What kind of arrangements are necessary for the teachers to use sign language effectively at schools?
- Q-11) How do you think the sign language course will contribute to your professional life?
- Q-12) What are your additional suggestions for sign language education?