

Introducing inclusive bimodal bilingual mainstream education in the Netherlands using best practices from Australia

Introduzindo a educação regular bilingue bimodal inclusiva na Holanda usando as melhores práticas da Austrália

Ellen Ormel

Radboud University – Nijmegen – the Netherlands

Annemarie Kerkhoff

Royal Auris Group – the Netherlands

Michelle Baker

Departamento de Educação – Queensland – Australia

Belinda van der Aa

Royal Auris Group – the Netherlands

Abstract: In the Netherlands, the majority of deaf and hard-of-hearing (DHH) children follow mainstream education, without direct instruction in sign language. While schools for the deaf may offer bimodal bilingual education, there is a general move towards more inclusive education. Internationally, bimodal bilingual (BiBi) mainstream schools have been set up to provide direct instruction in sign language to both deaf and hearing children, access to deaf peers and teachers who are specialised in educating DHH children. We present our plans for introducing a BiBi program in two mainstream schools in the Netherlands, drawing on the experiences and best practices of the Toowong State School in Brisbane, Australia. We will discuss remaining questions and challenges, such as how to get started, how to inform and inspire staff, what roles teaching assistants and interpreters should have, and how to introduce the use of sign language in the school for both deaf and hearing students. While practices and regulations may differ between countries, sharing challenges and best practices is both informative and inspiring. We aim to contribute to the discussion around inclusive education, and how to achieve barrier-free social interactions in an optimal learning environment for DHH children.

Keywords: Bimodal Bilingual (BiBi) school. Inclusive mainstream education. Co-enrolment. Primary education. Sign Language of The Netherlands (NGT).

Resumo: Na Holanda, a maioria das crianças surdas e com deficiência auditiva (SDA) segue a educação regular, sem instrução direta em língua de sinais. Embora as escolas para surdos possam oferecer educação bilingue bimodal, há um movimento geral em direção a uma educação mais inclusiva. Internacionalmente, escolas regulares bilingues bimodais (BiBi) foram criadas para fornecer instrução direta em língua de sinais para crianças surdas e ouvintes, acesso a colegas surdos e professores especializados em educar crianças SDA. Apresentamos nossos planos para a introdução de um programa BiBi em duas escolas regulares na Holanda, com base nas experiências e melhores práticas da Escola Estadual Toowong em Brisbane, Austrália. Discutiremos questões e desafios remanescentes, como por exemplo, como começar, como informar e inspirar a equipe, quais funções os assistentes de ensino e intérpretes devem ter e como introduzir o uso da língua de sinais na escola para alunos surdos e ouvintes. Embora as práticas e regulamentações possam diferir entre os países, compartilhar desafios e melhores práticas é informativo e inspirador. Nosso objetivo é contribuir para a discussão em torno da educação inclusiva e como alcançar interações sociais sem barreiras em um ambiente de aprendizado ideal para crianças com SDA.

Palavras-chave: Escola bilingue bimodal (BiBi). Educação regular inclusiva. Co-matrícula. Ensino Fundamental. Língua de sinais de Holanda (NGT).

1 Introduction

In the Netherlands, the majority of deaf and hard-of-hearing (DHH) children now attend mainstream schools, partly as a result of newborn hearing screening and improved hearing technology, and partly because the Dutch government encourages mainstreaming. If (initial) academic scores and (spoken and/or written) language development are deemed adequate, children are likely to be referred to mainstream education. The move to mainstream education has led to a decrease in the use of sign language, even though Sign Language of the Netherlands (NGT) received legal status in 2021. Within the current system, DHH children in mainstream education may experience academic delays and social isolation, impacting on children's career perspectives and well-being.

Recently, a group of concerned Dutch parents has requested more access to sign language for their deaf children by sending a letter to the Dutch House of Representatives. Following this request, the National Advisory Committee for NGT has advised the government to invest in sign language at home and in the school, to ensure that (1) parents are able to reach an adequate level of sign language proficiency, and (2) DHH children can continue to learn sign language throughout the school period.

Currently, in most mainstream schools, access to sign language is provided through an interpreter. However, the state does not provide funding to access sign language lessons, which would enable children to follow an interpreter. Moreover, the interpreter model in the classroom has been criticised, as it may provide only partial access to information (Caselli *et al.*, 2020; De Meulder & Hualand, 2021; De Meulder & Murray, 2021). For instance, access to classroom discourse is often limited and part of the intended message by the teacher may be missed. According to some, a more ideal situation is for children to be taught directly by a qualified teacher, not through mediated instruction (Kurz *et al.*, 2015; Schick *et al.*, 2006). A recent report on the right to education for DHH students in the Netherlands (commissioned by the Institute for Human

Rights) signalled that mainstream schools do not always sufficiently adjust to meet DHH children's needs (Hogeboom & Scholten, 2022).

Generally, academic outcomes of Dutch DHH children (with cochlear implant (CI) and/or hearing aids) are highly variable (Boons *et al.*, 2013; De Hoog *et al.*, 2016; Van der Straaten *et al.*, 2021). The risk of poor academic outcomes may result from a difficulty in accessing information. For instance, some Dutch DHH children report that they have trouble understanding both the teacher's spoken language and the interpreter's sign language (Rijke *et al.*, 2021). The lack of sufficient sign language skills to follow the interpreter may be partly due to the lack of sign language input in mainstream schools, which is necessary to keep up with increasing linguistic demands and school vocabulary. Also, children are not taught how to work with an interpreter in the classroom. Additionally, many DHH children in mainstream classrooms experience chronic listening fatigue, which may impact academic outcomes (Bess *et al.*, 2020).

Mainstreamed DHH children may also experience social isolation and loneliness, as reported in the international literature (e.g., McCain & Antia, 2005; Stevenson *et al.*, 2015; Wong *et al.*, 2017; Castellanos *et al.*, 2018). In line with these findings, Dutch mainstreamed DHH children are found to be regarded as less popular than their hearing classmates, and also less popular than their deaf peers in special education (Wolters *et al.*, 2011). Lower acceptance and popularity are related to social communication difficulties (improvising and pragmatic skills), as well as to prosocial behaviour. Dutch DHH children also experience more bullying (Broekhof *et al.*, 2018) and poorer psychosocial outcomes (Theunissen *et al.*, 2011; 2012; 2014; Boerrigter *et al.*, 2018; 2021; Rijke *et al.*, 2021). In these studies, language ability and communication (regardless of modality) are important predictors of psychosocial functioning. The use of sign language at home and the ability to understand their parents are also found to be predictors of mental well-being (Van Gent *et al.*, 2012). These findings mirror international findings on the role

of communication and pragmatic abilities (Goberis et al., 2012; Kushalnagar et al. 2011; Paatsch & Toe, 2022). There is also evidence that contact with signing peers increases DHH children's social-emotional skills, including empathy and Theory of Mind (Peterson, 2016).

In sum, DHH children in mainstream classrooms are at increased risk of poor academic and social-emotional outcomes, which may be due to reduced accessibility of (direct) instruction, difficulties with social communication, and the lack of deaf role models and peers (see also De Meulder & Hualand, 2021; De Meulder & Murray, 2021). At the same time, the benefits of sign language and the right to learn sign language are widely recognised (e.g., Hall et al., 2019; Humphries et al., 2012; 2022; Ormel & Giezen, 2014; Pontevorvo et al., 2023; Snoddon & Paul, 2020). For instance, there is evidence that Dutch children's knowledge of sign language is associated with better reading (Hermans et al., 2008; Ormel et al., 2012) and spoken language production (Hermans et al., 2010). These results mirror international findings that natural sign language may strengthen written and spoken language (e.g., Hoffmeister et al., 2022; Scott & Hoffmeister, 2016; Secora & Smith, 2021). Additionally, sign language has proven beneficial in boosting metalinguistic and conceptual knowledge, for instance, in subjects such as history (e.g., Svartholm, 2010).

Following the United Nations Convention on the Rights of Persons with Disabilities (CRPD), some countries have developed bimodal bilingual (BiBi) inclusive primary education programs to facilitate equal access to information in spoken language and sign language (Baker et al., 2019; Kramreiter & Krausneker, 2019; Krausneker, 2008; Krausneker et al., 2020; Torigoe, 2019; Wong, 2018; Wong et al., 2022; Xie et al., 2014). In a BiBi program, deaf and hearing children attend school together, in classes where a sign language and a spoken language form an equal part of the curriculum, involving a substantial number of deaf role models, and promoting deaf culture and equal status of spoken and signed languages. BiBi programs provide spoken language and sign language to all deaf and hearing children, by deaf and hearing staff,

through direct teaching rather than interpreting. These programs (e.g., in Hong Kong and Brisbane) report positive social inclusion and literacy outcomes for both hearing and deaf children (Baker et al., 2019; Tang et al., 2014; Wong, 2018; Wong et al., 2022; Yiu & Tang, 2014). Still, many questions around the construction of the optimal model of BiBi education for deaf and hearing children remain unanswered.

In the Netherlands, a BiBi program does not exist yet. One of the Dutch organisations for deaf education — the Royal Auris Group — is currently funding a pilot study to gradually introduce a BiBi program in two mainstream schools, with the aim of carefully monitoring the program and children's progress.

After a brief overview of deaf education in the Netherlands, we will describe the history and best practices of the Toowong State School in Brisbane, Australia (Baker et al., 2019), which serves as one of the models for the first Dutch BiBi program. Finally, we will discuss remaining challenges in setting up a BiBi program and our aims for the future.

2 Deaf education in the Netherlands

From 2001, organisations providing care and education for deaf children form a separate 'cluster 2' for children with auditory and communicative impairments, which includes children with developmental language disorder (DLD)¹. In 2014, a 'tailored education act' was adopted, according to which mainstream schools have a 'duty of care' to provide tailored education to all students with additional education needs, including DHH students. The CRPD was ratified by the Dutch government in 2016, which has inspired a move towards more inclusive education. In 2023, the government has published a report on the 'route to inclusive education', with the ambition to realise inclusive education in 2035 (which entails that parents will be able to send their child with special needs to any mainstream school of their choice).

¹Cluster 1 is dedicated to children with visual impairments, clusters 3 and 4 are specialised in education for children with medical, intellectual, behavioural or psychiatric disabilities.

In the Netherlands, as elsewhere, deaf children who are born to hearing non-signing parents do not automatically have access to sign language at home. Parents are able to access early (basic) sign language courses, reimbursed as medical costs, which they need to initiate themselves. There is currently no standardised information for parents about the benefits of sign language or the risk of language deprivation. Advice about language choices may differ depending on the service provider (e.g., the CI team, audiologist, Speech and Language Therapist (SLT), or early intervention specialist). From the age of 1.5 years, DHH children have access to toddler intervention groups. Depending on the region, some early intervention services offer placement in a bilingual toddler group, although the amount of sign language input may vary. Other toddler intervention groups offer sign supported Dutch (SSD). Parents can access services in their own region only.

Even children who have been exposed to natural sign language during early intervention may not have sufficient knowledge of sign language to be able to understand an interpreter when they transition to a mainstream school. The low level of sign language may, in part, be due to the lack of adult deaf linguistic models to guide families (Hamilton & Clark, 2020; Humphries *et al.*, 2022) and to the low status of sign language (Lillo-Martin *et al.*, 2021). Additionally, sign language skills may not be adequate to meet the increasing language demands in schools.

Upon entering the Dutch school system (from age 4), parents inform the school that their child has additional educational needs². The mainstream school will then assess whether they can provide the necessary services or whether they need provisions from a specialised 'cluster 2' organisation (i.e., itinerant support and/or a peripatetic teacher). A committee from the cluster 2 organisation subsequently determines whether a child will be placed in mainstream education (with provisions) or in special education. In case the child is placed in mainstream education, parents decide whether or not they want to

have a sign language interpreter for their child, irrespective of provisions.

3 Special education

DHH children with delays in spoken language and/or disabilities (such as intellectual disability or autism spectrum disorder) are more likely to be referred to schools for the deaf (see, e.g., Boons *et al.*, 2013; Langereis & Vermeulen, 2015). Only schools for the deaf provide instruction in sign language (i.e., NGT as a language of instruction) and sign language lessons (i.e., NGT as a target language). However, the use of natural sign language (rather than SSD) is not guaranteed in all schools for the deaf (e.g., Wauters *et al.*, 2006). Not all teachers or assistants are proficient in NGT, which means that not all deaf children are exposed to proficient (deaf) users of NGT in the classroom on a daily basis. In the Netherlands, there is no specific degree to become a Teacher of the Deaf (ToD), as anyone with a teaching degree may teach in special education. Teachers of the Deaf may have additional degrees in Special Educational Needs or in Deaf Studies. Schools may train staff on the job and/or invest in sign language lessons for new teachers. Special educational settings also aim at employing deaf teachers and/or deaf assistants, who also serve as role models for the students.

The main advantages of special educational settings are direct instruction in sign (i.e., NGT and/or SSD), and the presence of signing peers and (Deaf) signing staff, leading to a higher status of sign language. Also, schools for the deaf tend to have only around 8–14 children per class, and class assistants are present.

However, there are also disadvantages to this type of setting. Schools tend to be far from home, which is a major drawback for parents. Parents may also be reluctant to send their DHH children to special educational settings because of the larger number of students with additional disabilities or behavioural problems. Academic outcomes for DHH children in special education are generally lower than for DHH in mainstream education (Langereis & Vermeulen, 2015;

²DHH children who are referred to special education may start primary education from the age of 3.

Van der Straaten et al., 2021), which may be largely due to the different populations.

4 Mainstream education

In the period 2008-2018, around sixty percent of Dutch DHH children were in mainstream primary education (64% of hearing aid-users and 39% of CI-users), including children who started in special education and later switched (Van der Straaten et al., 2021). Even though DHH children in mainstream education attain lower levels of language and mathematics, they attend comparable levels of secondary education (compared to children with typical hearing). For instance, while 25% of children with typical hearing have below average language scores (25th percentile or lower), this applies to 38% of CI-users and 29% of hearing aid-users in mainstream education. CI-users who switched from special education to mainstream education have higher language scores than CI-users who were mainstreamed from the start (Van der Straaten et al., 2021).

DHH children in mainstream schools have a right to itinerant support from 'cluster 2' organisations, who can provide a peripatetic teacher to support the child and/or the school (for instance, they may advise the teacher on how to use an FM system). Such teachers typically visit the school for a couple of hours per week. However, peripatetic teachers may not have any knowledge of NGT or SSD.

Most mainstreamed DHH students do not use sign language interpreters, even though they might benefit from them³. Our estimation (based on records from itinerant teachers) is that around 10–16% of mainstreamed DHH children who use itinerant support use a sign language interpreter in class. It is possible that most parents and/or children do not feel the need for an interpreter, relying on tools such as wearable microphones or captioning. There is also a shortage of interpreters in the Netherlands, which may play a role.

³Since 1997, the Institute for Sign, Language & Deaf Studies offers a standard curriculum for teachers and interpreters of NGT at the University of Applied Sciences, Utrecht.

The low number may also reflect children's limited proficiency in sign language, which means interpreters are not an option—as they will not be useful to them.

The main advantages of mainstream education appear to be that schools are nearby and they allow more contact with hearing peers. Also, the level of education might be higher partly mainly due to the different population in special educational settings.

However, large class sizes (with 25 or more children in one classroom) and the lack of teacher assistants are challenging for many children. It is clear that such class sizes are even less ideal for DHH children, who may rely heavily on hearing technology and speech reading. Moreover, DHH children commonly do not have any deaf peers in their classroom or school.

Within mainstream education, co-enrolment programs can be seen as a first step towards inclusive education, by placing a small group of DHH students in a regular classroom (see e.g., Kreimeyer et al., 2000). In the Netherlands, the largest organisation for deaf education—Royal Kentalis—initiated the first Dutch co-enrolment program at the Twinschool in 2003, based on the TRIPOD program (Kirchner, 1994). This setting had positive effects on the acceptance and well-being of the DHH students (Hermans et al., 2014). However, the Twinschool was ultimately discontinued because of the widening educational gap between hearing and DHH children and the feeling that the school could not adequately serve the DHH children's needs (De Klerk et al., 2019).

Since 2013, there is a co-enrolment program between a mainstream school ("De Bolster") and a school for the deaf ("Kentalis Talent"). While the setting was similar to the Twinschool, the mainstream school had a 'whole school commitment', meaning that all staff members are committed to educating all children, regardless of (socio-economic) background. A hearing mainstream teacher and a hearing ToD form a co-teaching team, the latter assigned to a class-room depending on the number of DHH children present. For instance, with four DHH children, the peripatetic ToD is present two days per week. Both teachers make use of an FM system, as the ToD uses SSD. Classroom

interpreters are present on a full-time basis, a deaf sign language teacher (teaching NGT and Deaf culture to the DHH children) is only present for some hours per week (starting with 1.5 hours per week, which has been reduced to 0.5 hours per week). The deaf sign language teacher also delivers pre-teaching for reading and academic subjects (such as history or geography). In addition, an SLT is available for extra support. This co-enrolment setting is described as ‘the best of both worlds’, providing both a larger peer group and a normal pace of instruction, together with specialised didactic support for DHH children, access to sign language lessons and a deaf role model (De Klerk et al., 2019). In this setting, spoken language skills of DHH students were still highly variable. However, DHH students’ well-being was found to be similar or even slightly higher in comparison to hearing children (De Klerk et al., 2019).

Since 2017, Auris provides a similar co-enrolment program in a mainstream school (“De Kleine Dichter” in Utrecht), with a hearing teacher and interpreter in the classroom and a full-time hearing peripatetic teacher, who supports the teacher and is involved in pre-teaching and remedial teaching (using SSD). A deaf sign language teacher is present two days per week and an SLT is present one day per week.

While students may do very well in this type of mainstream co-enrolment education, many of the challenges remain. Crucially, DHH children might still experience social isolation, because the hearing children have no working knowledge of sign language and the group of DHH children in each class tends to be small (in some classes there are only two). Also, instruction in SSD does not constitute bilingual education. Finally, indirect instruction through interpreters is not ideal, in particular when DHH students have a low level of sign language. The reliance on auditory information may lead to listening fatigue and stress, as well as information gaps (for instance when the teacher faces the blackboard while talking or when classmates are talking in groups).

A BiBi co-enrolment program appears to be a viable alternative, providing direct access to

information in sign language and spoken language, presence of deaf adult role models, as well as contact with hearing peers. A crucial difference with current co-enrolment programs is that the hearing students also learn sign language. Not only does such a program address requests from parents for more sign language in mainstream schools, it also is a next step towards truly inclusive education (see, e.g., Krausneker et al., 2020; Stinson & Antia, 1999).

5 Inclusive education

The first Dutch school offering bimodal bilingual inclusive education will be modelled after the co-enrolment BiBi program at Toowong State School in Brisbane. We intend to start by introducing BiBi co-teaching for children in two schools. The aim is to have a deaf signing teacher as one of the co-teachers in each classroom, which will promote equal status of both languages. Moreover, both DHH and hearing children will be learning NGT. Auris will provide support and facilitate the introduction of (Deaf) fluent signing teachers. During this first stage, Auris is in close contact with the founders of Toowong State School to learn from their best practices. After describing the Toowong State School in more detail, we will address questions and concerns from Auris teachers and professionals.

6 Toowong State School, Brisbane, Australia

Toowong State School is a relatively small metropolitan primary school in the state of Queensland Australia. It is situated in the capital city of Brisbane. The Toowong Auslan (Australian sign language) / English BiBi co-enrolment Program began with a single Year 1 class in 2001 and was phased in over six years until it was offered at all year levels across the primary school.

The impetus for the program came from advocacy from the Deaf community and from a group of parents who saw the benefits of sign bilingualism for their children. These parents desired for their child to have access to and be fluent in two languages

(including a sign language), have access to deaf peers and Deaf community and culture, but also have access to all the curriculum options hearing children receive in mainstream schools and have the opportunity to learn how to navigate and live in the hearing world.

Until the establishment of Toowong in Queensland, DHH children either attended mainstream schools and used additional devices to access information provided in the classroom, or used sign supported speech and attended mainstream schools with unit settings attached to these schools in which most of their learning occurred. Toowong offered an alternative to provide for both groups—if their families desired it.

Toowong was chosen because it was a small school, which at that time had a population of 270. It was felt that a minority language and culture would have a space to thrive in a small school, and could not be ignored. The school had no previous connection with educating deaf students. This meant starting from scratch but it also meant not needing to work through complex history.

The BiBi co-enrolment program has just celebrated 21 years and looks much the same as it did at the outset—only larger. The school now has approximately 400 students and over 40 of these students are DHH. In addition, siblings and codas (children of deaf adults) are enrolled in the school. The majority of the school are local hearing children from hearing families.

All year levels in the primary school offer a sign-speech bimodal bilingual class and a non-bilingual class. DHH students are clustered in the bimodal bilingual classes. In each class, numbers of deaf students range from four to eight. The hearing students are a combination of codas, siblings and hearing children from hearing families who highly value bilingualism. In fact, the bilingual classes are always filled first and often have waiting lists. All the classes in the school have Auslan as their school curriculum language, meaning all students in the school learn sign language formally. This stimulates friendships across classes, and it also means it is easy to move hearing

students from the non-bilingual to bilingual stream when a space becomes available.

Almost a third of the school has a connection to the Deaf community in some capacity, but this was not always the case. It began with one small class of five profoundly deaf children who did not use speech or audition in Year 1. The advent of the CI is evident, with approximately two thirds of the students now having spoken language as their first language and the remainder having sign language as their first, most accessible language, and written English as their second.

The program was also based on the TRIPOD program in the United States (Kirchner, 1994). Each bilingual class has anywhere from 20 to 30 students – some of whom are DHH and some who are hearing. The classes are staffed with a Teacher of the Deaf and a classroom teacher, who are both fluent in sign (or working towards that goal). These teachers share responsibility for all planning and delivery for all students. In addition, every class employs a deaf Language Assistant (Teacher Assistant) who is a key sign language role model. This is particularly important if the ToD is hearing. Without elevating this person in their role, the language and cultural balance in the room is missing. When this is done well, at least from the children's perspective, it is like there are three teachers in the room who work with them. The message about empowerment ("Deaf CAN") cannot be understated, as it is a key element in the most successful classrooms. The school now employs approximately twelve deaf staff members, and will have four deaf ToD as classroom teachers in 2024. The majority of all staff in the entire school now have signing skills.

The school also employs a number of hearing teacher aides who have signing skills. Where appropriate, these staff may be called upon to interpret. This can occur when specialist classes have a teacher who cannot sign, or when a non-signing visitor comes to the classroom, for example. The use of an interpreter in teaching instruction (mediated instruction) is avoided wherever possible. Rather, teachers are very adept at teaching and moving

between both languages. Professional interpreters are employed from outside the school when teachers require interpreters. The school has found that a power imbalance occurs if school staff are used to interpreting for deaf staff with other hearing colleagues in the school. The bilingual classes follow an immersion approach, and students learn subjects in Auslan and English (including signing in English word order or the use of a Natural Sign System/Signing in English).

The program was established in collaboration with key stakeholder groups (e.g., parent groups, Deaf community and organisations). The following guiding principles were established for the program:

1. The deaf child's need for early exposure to an accessible first language is of the utmost importance. For some deaf children, visual communication is the most accessible communication system and Auslan is a first language option.

2. Auslan and English are equally valued within the program. Fluency in both Auslan and English is a desired outcome of the program. Students will have the opportunity to learn in Auslan and in English.

3. Individual communication needs are valued and catered for in the program. Communication modes available in both Deaf and hearing cultures are available to students in the program; e.g., signing, speaking, listening, reading, and writing.

4. Contributions from all stakeholders (including parents and the Deaf community) are valued and considered important in the functioning of the program.

5. Deaf and hearing cultures are equally valued within the program. Deaf and hearing role models are an integral part of the program, assisting in the development of deaf children's healthy identity and helping them establish their place in both Deaf and hearing cultures.

6. The role of parents as caregivers and as important language models for the deaf child is critical for the success of the program.

7. The inclusion of Deaf and hearing staff who have or are aiming towards fluency in Auslan and English is critical for the success of the program.

Leadership with Deaf knowledge and ToD skills ensures the design of school life in such a way that accessibility for deaf students, deaf parents, and deaf staff is optimised. This person also has a key role in supporting professional development for staff in the bilingual programs. Professional development includes training sessions, mentoring sessions, and watching others work (WOW) sessions. Training for support staff and non-bilingual staff (e.g., Deaf Awareness Training, Sign Language Courses) are also available.

By far the most challenging component of the program is the matching of teaching partnerships. The investment in the two teachers as a team is imperative to the success of the classrooms. To this end, the school allows the teachers additional preparation time together. People often assume that planning time is less, or halved even. In fact, that is not the case. At the start of the teaching relationship, teachers are getting to know each other's preferences for planning, communication, use of technology, behaviour management, as well as how they will share responsibility for reporting, parent-teacher interviews, etc. Over the years, the school has found a handful of partnerships that simply did not work and discontinued them after a year. In these teams generally one teacher realised they preferred to work on their own and that co-teaching was not for them. However, with the right investment of time and leadership, the classes soar and these teachers often describe it as the best teaching experience of their careers.

A BiBi program may offer important advantages for all children. For DHH children, a BiBi setting is beneficial for overall language development, cognitive development, and social-emotional development. It provides deaf and hearing peers who share their language, more friendship choices, a broader curriculum choice and choice of teachers, multiple deaf role models to aspire to, multiple adult language models, full-time access to a teacher of the Deaf, and equitable access to a tailored curriculum. For hearing children, it provides an opportunity to learn a second language, which may have positive effects on their cognitive and social development (Bialystok & Werker, 2017). Both deaf and hearing children are

learning in—and are able to compare—the two languages. Finally, it gives hearing children the opportunity to understand what inclusion really is, and to celebrate differences.

Some of the hearing students are now professional sign language interpreters, some are Speech and Language Pathologists who sign, and others have become teachers of the deaf. DHH students from Toowong have studied at all levels of university, or are working as teachers, linguists, or PhD candidates. Other DHH students have returned to the school to take a role as a language assistant.

7 Questions and best practices

We collected questions from Auris teachers and professionals and asked for feedback from the third author, based on her expertise and best practices at Toowong State School. An important first question was *how to inform and inspire staff about the BiBi program*. A good way to do this is to show staff videos of teachers talking about their experience. Teachers should be given the opportunity to access fun signing classes before the semester begins, so they enter the program knowing something, led by deaf people who are good at working with hearing people. Also, get teachers to write down their ten most common phrases (e.g., “fetch your lunch box”, etc.) and make a video of that—teach them to use it so they feel confident on the first few days. Finally, give the co-teachers preparation time for the first week—it is a bit like going back to beginning teaching at first, using lesson plans and communicating until you get to know each other.

A related question is *how to ensure sign language proficiency of the school staff*. At Toowong State school, before the start of the program, six months of sign language classes were offered after school for all staff—from the cleaners to the principal. Sign language classes were also offered to parents of hearing families.

Auris professionals also have questions about the *role of assistants*, and whether teaching assistants and interpreters should only be mediating between the two languages or also handling educational tasks. In

the Netherlands, interpreters generally need to stick to the interpreter code of conduct. At Toowong State School, the assistants are definitely not only mediating. Assistants function both as Auslan ‘language models’ and aids. Assistants cannot work in a traditional interpreter manner. They have to be child-friendly, get down on the ground for example, and sometimes take an activity with a small group. Interpreters, who may be asked to interpret in a traditional manner, may sign and talk simultaneously sometimes, to try and build a bridge for beginning learners of sign language.

A related question is whether a teaching assistant is always necessary, or whether the presence of two teachers (deaf and hearing) is sufficient. This is not a practice at Toowong, but it might work. A teaching partnership that has a deaf and a hearing teacher is very powerful, if the hearing person is prepared to step back and let the deaf person lead as well. Trust in each other is paramount, knowing and accepting that your partner will not always do things the way you do.

Other questions involve language choices, and the amount of instruction offered in spoken language and sign language. There is a concern that the presence of just a few deaf children (who will have at least partial access to spoken language) might lead to reliance on spoken Dutch, certainly in comparison to special education settings. In Australia, learning a second language is compulsory. At Toowong, the whole school learns Auslan (i.e., ‘voice off’) from a deaf person for one hour per week. For subjects such as mathematics and reading, sign language could be ‘phased in’ gradually. At Toowong, the full curriculum is offered in both languages. Teaching focuses on interactive activities and cooperative learning, rather than traditional text book activities. This allows for flexibility, for instance offering one component in Auslan and another in English, or perhaps starting with English and switching to Auslan for a consolidation activity. Also, it is helpful to create bilingual resources. For instance, at Toowong, Auslan videos of fifty of the most beautiful picture story books were created and overlaid on the illustrations, to take home so that deaf

and hearing children could use either or both. They all used both and the families learned too.

Teaching maths is an art in itself. It is essential to know how to teach the concepts, what signs and words are key to target, and how to incorporate concrete materials and resources. At Toowong, deaf language assistants have proven invaluable for this process. Also, there are asynchronous ‘voice off’ maths lessons in Auslan around different concepts. Sometimes ‘voice over’ is added for the benefit of hearing people learning to sign, but the children often do not use it. Instead, they practice a new concept in sign that they learned the day before in English. Activities are created in both languages, which are actively compared. For instance, when teaching plurals or conjunctions in English, they are also taught in Auslan. If the child has Auslan as a first language, it is best to begin with Auslan and then connect the English, perhaps aided by pre-teaching.

The issue of *overreliance on spoken language* is influenced by what the adults in the room model—if they rely on it, the children will too. The relationship between the two teachers is important for modelling and valuing sign language, especially if the deaf teacher does not use speech. It is paramount that the hearing teacher learns to sign and communicate directly with their deaf teaching partner. For instance, if the hearing teacher turns on their voice when asking a deaf teacher for help with something, that is what the students will do. If a hearing teacher calls out to get a child’s attention in the ‘hearing way’, that’s what students will do. Flashing lights, waving or walking over and tapping someone is better for everyone. If the bell rings, the lights flash. If a person comes to the door, they know they have to wait until all eyes are on them and if they are a non-signer, they know they have to wait for the “interpreter” to come and “help them” because they don’t sign.

A related question is how many DHH students are needed for a ‘*critical mass*’, and how the use of sign language among the students can be stimulated. At Toowong, the first class of 24 children had five deaf children, mirroring Kirchner’s ratio of four or five hearing children to one deaf child. However, classes

have become bigger, and the ratios are changing because many DHH children are doing well with spoken language. Generally, it is easy to ignore one or two children in your class, but not six or seven. Also, empowering sign language and deaf culture in the classroom will be more difficult when there are two hearing teachers, who may not sign well or demonstrate respect for the deaf adult in the room. ‘Critical mass’ is also important for the whole school (for instance, to ensure that people remember to have an interpreter for the school quiz night). With enough deaf presence at the school, including DHH students, codas, siblings, and staff members’ children from bilingual classrooms, the group is not really a minority that can be overlooked.

At Toowong, to stimulate sign language more generally, ‘voice off’ games and times are created. For instance, children stand in an English hoop and then in an Auslan hoop, or teachers wear an Auslan hat or an English hat. Stories are first read in English and then signed in Auslan. It is also helpful to find Deaf community parallels, such as Deaf Olympics when covering Olympics, or deaf pioneers when covering famous pioneers, or celebrating International Day of Sign Languages. It is important to think about ways in which both languages and cultures can permeate every element of the school day.

Auris professionals are also interested in the *academic benefits of BiBi education* for deaf and hearing students. Although data from the BiBi program in Queensland have not been studied extensively yet, there is a lot of anecdotal evidence. Sign language assessments of deaf and hearing students show age-appropriate fluency. The bilingual classes perform equal to—and regularly outperform—the non-bilingual classes on national reading, writing and mathematical tests. Of course, there are deaf and hearing children who struggle in every single class. For some of the DHH students, specialised pedagogy is key. For others, the use of sign language is about identity and culture, providing them with a community in which they belong, where they don’t have to be the person who works hardest to understand and be understood. Social isolation, identity and well-being is not an issue

in the school, due to the cohort and 'critical mass' of DHH students and the bilingual bicultural approach. Very occasionally there is a student who is not a good fit for a bilingual class. For instance, a student with autism spectrum disorder (ASD) found the classroom too visually overwhelming. However, many children with ASD do well in these classes, perhaps because social behaviour is so explicitly and visually modelled.

A final question is *how the rise of this form of inclusive education* will affect special education in the Netherlands. Inclusive education could be seen by some as a threat to schools for the deaf, which currently have large numbers of deaf peers and staff, as well as a bimodal bilingual setting and a (rather) high level of sign language. If such schools will evolve to predominantly accept deaf children with additional disabilities (such as intellectual impairment), this will affect the diversity of the population and the general level of education. The Dutch situation thus differs from the situation in Queensland, which does not have a school for the deaf. At Toowong, there is currently no additional specialist staff for DHH students with comorbidities or intellectual disability. However, in the future, such provision might be necessary to lessen demands on the staff.

8 Discussion and conclusion

BiBi schools were set up to provide direct instruction in sign language to both deaf and hearing children, access to deaf peers and specialised Teachers of the Deaf. The experience at Toowong and international research shows that a socio-linguistic focus is necessary for true inclusion (see also De Meulder & Hualand, 2021; De Meulder & Murray, 2021). Key factors for the success of a BiBi program according to the literature and best practices seem to be: (1) starting small to enable better monitoring, (2) a supportive Deaf community, (3) a critical mass of DHH children and a consistent intake of students, and (4) skilled and dedicated staff.

Bimodal bilingualism has benefits for language development, cognitive development and social-emotional development of DHH children. BiBi co-

enrolment programs in particular have a positive effect on the academic attainment and well-being of DHH children (e.g., Baker et al., 2019). Best practices from Toowong State school suggest that such a program is feasible in the Netherlands, meeting the need for more inclusive mainstream education for DHH children. BiBi programs offer a clear advantage over the current practice of (interpreter-mediated) education in mainstream classrooms. However, in the Netherlands, special educational settings also offer advantages to DHH children, which means that we need to advise parents carefully about the different options. Another option to make current schools more inclusive could be the practice of 'reversed inclusion', accepting hearing children (e.g., codas or siblings of DHH children) into special educational settings.

In the Netherlands, we still face many practical challenges, mainly concerning staff. For instance, deaf staff members may not be willing to be the only deaf teacher among hearing staff. Also, attracting sign language teachers may call for flexibility. For instance, a deaf person may be an excellent teacher and role model but may not always be officially qualified to teach. It may also be difficult to find assistants and interpreters, whose roles may also need flexibility. Other practical challenges involve training and supporting staff members and monitoring students' progress (see also De Klerk et al., 2019). Finally, the curriculum also needs to be flexible. Spending time on sign language lessons means that these will need to replace other parts of the curriculum. For instance, in schools for the deaf, NGT classes often replace music lessons.

We call for sharing of information between countries that have started BiBi schools and those that are aiming to start such schools, to further improve the future education and quality of life of DHH children.

9 Acknowledgments

We thank Beppie van den Bogaerde for feedback on the first draft.

References

- Baker, M., Miller, C., Fletcher, E., Gamin, C., & Carty, B. (2019). Co-enrolment in Toowong, Australia. In M. Marschark, S. Antia & H. Knoors (Eds.), *Co-enrolment in deaf education* (pp. 41-67). Oxford University Press.
- Bess, F. H., Davis, H., Camarata, S., & Hornsby, B. W. (2020). Listening-related fatigue in children with unilateral hearing loss. *Language, speech, and hearing services in schools, 51(1)*, 84-97.
- Bialystok, E., & Werker, J.F. (2017). The systematic effects of bilingualism on children's development. *Developmental Science, 20*, e12535.
- Boons, T., De Raeve, L., Langereis, M., Peeraer, L., Wouters, J., & van Wieringen, A. (2013). Expressive vocabulary, morphology, syntax and narrative skills in profoundly deaf children after early cochlear implantation. *Research in Developmental Disabilities, 34(6)*, 2008-2022.
- Boerrigter, M., Vermeulen, A., Marres, H., & Langereis, M. (2018). Personality Traits of Profoundly Hearing Impaired Adolescents with Cochlear Implants—A Comparison with Normal Hearing Peers. *Frontiers in Psychology, 9*, 161.
- Boerrigter, M., Vermeulen, A., Marres, H., Mylanus, E., & Langereis, M. (2021). Self-concept of children and adolescents with cochlear implants. *International Journal of Pediatric Otorhinolaryngology, 141*, 110506.
- Broekhof, E., Bos, M. G., Camodeca, M., & Rieffe, C. (2018). Longitudinal associations between bullying and emotions in deaf and hard of hearing adolescents. *The Journal of Deaf Studies and Deaf Education, 23(1)*, 17-27.
- Caselli, N. K., Hall, W., & Henner, J. (2020). American Sign Language interpreters in public schools: An illusion of inclusion that perpetuates language deprivation. *Maternal and Child Health Journal, 24(11)*, 1323-1329.
- Castellanos, I., Kronenberger, W. G., & Pisoni, D. B. (2018). Psychosocial outcomes in long-term cochlear implant users. *Ear and hearing, 39(3)*, 527.
- De Hoog, B., Langereis, M., van Weerdenburg, M., Knoors, H., & Verhoeven, L. (2016). Linguistic profiles of children with CI as compared with children with hearing or specific language impairment. *International Journal of Language & Communication Disorders, 51(5)*, 518-530.
- De Klerk, A., Hermans, D., Wauters, L., De Laat, L., De Kroon, F., & Knoors, H. (2019). The Best of Both Worlds: A Co-Enrolment Program for DHH Children in the Netherlands. In M. Marschark, S. Antia & H. Knoors (Eds.), *Co-Enrolment in Deaf Education* (pp. 183-210). Oxford University Press.
- De Meulder, M., & Hualand, H. (2021). Sign language interpreting services: A quick fix for inclusion? *Translation and Interpreting Studies, 16(1)*, 19-40.
- De Meulder, M., & Murray, J. J. (2021). The illusion of choice in inclusive education. *International Journal of Inclusive Education, 8(20)*, 1-15.
- Goberis, D., Beams, D., Dalpes, M., Abrisch, A., Baca, R., & Yoshinaga-Itano, C. (2012). The missing link in language development of deaf and hard of hearing children: pragmatic language development. *Seminars in Speech and Language, 33*, 297-309.
- Hall, M. L., Hall, W. C., & Caselli, N. K. (2019). Deaf children need language, not (just) speech. *First Language, 39(4)*, 367-395.
- Hamilton, B. M., & Clark, M. D. (2020). The Deaf Mentor program: Benefits to families. *Psychology, 11(5)*, 713-736.
- Hermans, D., Knoors, H., Ormel, E., & Verhoeven, L. (2008). The relationship between the reading and signing skills of deaf children in bilingual education programs. *Journal of Deaf Studies and Deaf Education, 13*, 518-530.
- Hoffmeister, R., Henner, J., Caldwell-Harris, C., & Novogrodsky, R. (2022). Deaf children's ASL vocabulary and ASL syntax knowledge supports English knowledge. *The Journal of Deaf Studies and Deaf Education, 27(1)*, 37-47.
- Hogeboom, L., & Scholten, C. (2022). Recht op onderwijs voor dove en slechthorende leerlingen. Verkenning naar knelpunten en oplossingsrichtingen voor onderwijs voor dove en slechthorende leerlingen in Nederland. [Right to education for deaf and hard-of-hearing students in the Netherlands. Exploring obstacles and solutions for education for deaf and hard-of-hearing students in the Netherlands]. DSP-groep.
- Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D.J., Padden, C., Rathmann, C., & Smith, S. R. (2012). Language acquisition for deaf children: Reducing the harms of zero tolerance to the use of alternative approaches. *Harm Reduction Journal*,

- Humphries, T., Mathur, G., Napoli, D. J., Padden, C., Rathmann, C. (2022). Deaf Children Need Rich Language Input from the Start: Support in Advising Parents. *Children*, 9, 1609.
- Kirchner, C. J. (1994). Co-enrollment as an inclusion model. *American Annals of the Deaf*, 139, 163-164.
- Kramreiter, S., & Krausneker, V. (2019). Bilingual, inclusive, mixed-age schooling in Vienna. In M. Marschark, S. Antia & H. Knoors (Eds.), *Co-enrolment in deaf education* (pp. 133-147). Oxford University Press.
- Krausneker, V. (2008). Language Use and awareness in a bilingual setting. In C. Plaza-Pust & E. Morales-Lopez (Eds.), *Sign Bilingualism: Language Development, Interaction, and Maintenance in Sign Language Contact Situations* (pp. 195-222). John Benjamins.
- Krausneker, V., Becker, C., Audeoud, M., & Tarcsiová, D. (2020). Bilingual School Education with Spoken and Signed Languages in Europe. *International Journal of Bilingual Education and Bilingualism*, 25(5), 1794-1810.
- 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*, 5, 174-185.
- Kurz, K. B., Schick, B., & Hauser, P. C. (2015). Deaf Children's Science Content Learning in Direct Instruction Versus Interpreted Instruction. *Journal of Science Education for students with disabilities*, 18(1), 23-37.
- Kushalnagar, P., Topolski, T. D., Schick, B., Edwards, T. C., Skalicky, A. M., & Patrick, D. L. (2011). Mode of communication, perceived level of understanding, and perceived quality of life in youth who are deaf or hard of hearing. *Journal of deaf studies and deaf education*, 16(4), 512-523.
- Langereis, M., & Vermeulen, A. (2015). School performance and wellbeing of children with CI in different communicative educational environments. *International Journal of Pediatric Otorhinolaryngology*, 79(6), 834-839.
- Lillo-Martin, D. C., Gale, E., & Chen Pichler, D. (2021). Family ASL: An Early Start to Equitable Education for Deaf Children. *Topics in Early Childhood*
- McCain, K. G., & Antia, S. (2005). Academic and social status of hearing, deaf, and hard of hearing students participating in a co-enrolled classroom. *Communication Disorders Quarterly*, 27(1), 20-32.
- Ormel, E., & Giezen, M. R. (2014). Bimodal bilingual cross-language interaction: Pieces of the puzzle. In M. Marschark, G. Tang & H. Knoors (Eds.), *Bilingualism and bilingual deaf education* (pp. 74-101). Oxford University Press.
- Ormel, E., Hermans, D., Knoors, H., & Verhoeven, L. (2012). Cross-language effects in visual word recognition: The case of bilingual deaf children. *Bilingualism: Language and Cognition*, 15, 288-303.
- Paatsch, L., & Toe, D. (2020). The impact of pragmatic delays for deaf and hard of hearing students in mainstream classrooms. *Pediatrics*, 146(Supplement 3), S292-S297.
- Peterson, C. C. (2016). Empathy and theory of mind in deaf and hearing children. *Journal of deaf studies and deaf education*, 21(2), 141-147.
- Pontecorvo, E., Higgings, M, Mora, J., Lieberman, A. M., Pyers, J., & Caselli, N. K. (2023). Learning a sign language does not hinder acquisition of a spoken language, *Journal of Speech, Language, and Hearing Research*, 66(4), 1291-1308.
- Rijke, W. J., Vermeulen, A. M., Wendrich, K., Mylanus, E., Langereis, M. C., & van der Wilt, G. J. (2021). Capability of deaf children with a cochlear implant. *Disability and rehabilitation*, 43(14), 1989-1994.
- Schick, B., Williams, K., & Kupermintz, H. (2006). Look who's being left behind: Educational interpreters and access to education for deaf and hard-of-hearing students. *Journal of deaf studies and deaf education*, 11(1), 3-20.
- Secora, K., & Smith, D. (2021). The Benefit of the "And" for Considerations of Language Modality for Deaf and Hard-of-Hearing Children. *Perspectives of the ASHA Special Interest Groups*, 6(2), 397-401.
- Scott, J. A., & Hoffmeister, R. J. (2016). American Sign Language and academic English: Factors influencing the reading of bilingual secondary school deaf and hard of hearing students. *The Journal of Deaf Studies and Deaf Education*, 22, 59-71.

- Snoddon, K., & Paul, J. J. (2020). Framing sign language as a health need in Canadian and international policy. *Maternal and Child Health Journal*, 24(11), 1360-1364.
- Stevenson, J., Kreppner, J., Pimperton, H., Worsfold, S., & Kennedy, C. (2015). Emotional and behavioural difficulties in children and adolescents with hearing impairment: a systematic review and meta-analysis. *European child & adolescent psychiatry*, 24, 477-496.
- Stinson, M., & Antia, S. (1999). Considerations in educating deaf and hard-of-hearing students in inclusive settings. *Journal of Deaf Studies and Deaf Education*, 4(3), 163-175.
- Svartholm, K. (2010). Bilingual education for deaf children in Sweden. *International journal of bilingual education and bilingualism*, 13(2), 159-174.
- Tang, G., Lam, S., & Yiu, C. (2014). Language development of deaf children in a sign bilingual and co-enrolment environment. In M. Marschark, G. Tang & H. Knoors (Eds.), *Bilingualism and bilingual deaf education* (pp. 313-341). Oxford University Press.
- Theunissen, S. C., Rieffe, C., Kouwenberg, M., De Raeve, L., Soede, W., Briaire, J. J., & Frijns, J. H. (2012). Anxiety in children with hearing aids or cochlear implants compared to normally hearing controls. *The Laryngoscope*, 122(3), 654-659.
- Theunissen, S. C., Rieffe, C., Kouwenberg, M., Soede, W., Briaire, J. J., & Frijns, J. H. (2011). Depression in hearing-impaired children. *International Journal of Pediatric Otorhinolaryngology*, 75(10), 1313-1317.
- Theunissen, S. C., Rieffe, C., Netten, A. P., Briaire, J. J., Soede, W., Schoones, J. W., & Frijns, J. H. (2014). Psychopathology and its risk and protective factors in hearing-impaired children and adolescents: A systematic review. *JAMA Pediatrics*, 168(2), 170-177.
- Torigoe, T. (2019). Learning together by deaf and hearing students in a Japanese primary school. In M. Marschark, S. Antia & H. Knoors (Eds.), *Co-enrolment in deaf education* (pp. 69-81). Oxford University Press.
- Van der Straaten, T. F., Briaire, J. J., Dirks, E., Soede, W., Rieffe, C., & Frijns, J. H. (2021). The School Career of Children with Hearing Loss in Different Primary Educational Settings — A Large Longitudinal Nationwide Study. *The Journal of Deaf Studies and Deaf Education*, 26(3), 405-416.
- Van Gent, T., Goedhart, Arnold W., Knoors, H. E. T., Westenberg, P. M., Treffers, P. D. A. (2012). Self-concept and Ego Development in Deaf Adolescents: A Comparative Study, *The Journal of Deaf Studies and Deaf Education*, 17(3), 333-351.
- Wauters, L. N., van Bon, W., & Tellings, A. (2006). Reading comprehension of Dutch deaf children. *Reading and Writing*, 19, 49-76.
- Werfel, K. L., & Hendricks, A. E. (2016). The relation between child versus parent report of chronic fatigue and language/literacy skills in school-age children with cochlear implants. *Ear and Hearing*, 37(2), 216-224.
- Wolters, N., Knoors, H., Cillessen, A. H. N., & Verhoeven, L. (2011). Predicting acceptance and popularity in early adolescents as a function of hearing status, educational setting, and gender. *Research in Developmental Disabilities*, 32, 2553-2565.
- Wong, C. L., Ching, T. Y. C., Cupples, L., Button, L., Leigh, G., Marnane, V., . . . Martin, L. (2017). Psychosocial development in 5-year-old children with hearing loss using hearing aids or cochlear implants. *Trends in Hearing*, 21, 1-19.
- Wong, F., Tang, G., Yeung, P.-S., Yoi, C. K.-M. (2022). Emerging ecology of a sign bilingualism and co-enrolment classroom: A qualitative analysis. (Special Issue). *Sign Language, Deaf Culture, and Bilingual Education*, 58, 52-82.
- Xie, Y. H., Potměšil, M., & Peters, B. (2014). Children who are deaf or hard of hearing in inclusive educational settings: A literature review on interactions with peers. *Journal of Deaf Studies and Deaf Education*, 19(4), 423-437.
- Yiu, C., & Tang, G. (2014). Social Integration of deaf and hard-of-hearing students in a sign bilingual and co-enrolment environment. In M. Marschark, G. Tang & H. Knoors (Eds.), *Bilingualism and Bilingual Deaf Education* (pp. 342-367). Oxford University Press.