

Sign Bilingual and Co-enrollment Education for Children with Cochlear Implants in

Madrid, Spain: A Case Study

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RUNNING HEAD: Sign Bilingual and Co-enrollment Education

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<1> Abstract

In this chapter we will describe the novel educational experience offered to deaf children in Madrid, Spain. In order to understand the main characteristics of this educational intervention we will briefly set-out the educational, linguistic and social context of our country in the second half of the 1990s: including an emphasis on oral language, a mainstreaming policy, limited research in sign language but an increasing involvement of the Deaf community in schools. Following this brief introduction we will focus on the community of Madrid. We will describe the current teaching practices in 4 schools. The teaching philosophy in these schools is termed “Sign Bilingual and Co-enrolment Education” meaning deaf and hearing children learn in both Spanish and Spanish Sign Language classrooms together. The practice has been to maintain a proportion of 15-20 hearing children and 5-6 deaf children per classroom. Great emphasis is put on the description of language planning for children by professionals focusing on optimal exposure to the two languages in the classroom. We carried out a longitudinal study of the bilingual language development of children with an early cochlear implant. We found that the children made progress in acquisition of both Spanish Sign Language and spoken Spanish. Their language skills were between their hearing and chronological ages. We also document normal socio-emotional development. Last, we conclude with some discussion of the present challenges and implications of our work.

Keywords: bilingualism, cochlear implant, language development, co-enrollment education, language planning, inclusive education

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<1> Prologue

The authors combine expertise in education and developmental psychology and have come together to report on the latest findings from bilingual school approaches in Madrid, Spain. It can be the case that researchers and educationalists have different objectives. Researchers set out to test hypotheses or advance theories while educationalists are primarily concerned with the everyday experience of children in the classroom in order to improve educational outcomes. It is important that both sets of professionals work more in tandem. In this chapter, we will first describe the historical and social background of what how bilinguals sign education evolved in Spain and the content of the bilingual program used in Madrid schools. We then report on results of a longitudinal study of the language development of children with a cochlear implant (CI) in these schools. Last, we conclude with some discussion of the present challenges and implications of our work.

<1> How did we arrive at sign bilingual education in Madrid?

In order to understand the current bilingual education practices, it is important to consider social and legal changes towards disability and linguistic minority groups over the past three decades in Spain. Until 1985, deaf children were educated in residential special schools. The experience was one based on rehabilitation, strong oralism and a parallel or reduced version of the mainstream curriculum. From 1985 onwards, this changed to an integration policy for all children with disabilities, including deafness. This policy change was backed up with a significant investment in funding and personnel, which had major educational and social impacts. The government's department of education developed a legal framework and started ambitious plans for teacher training. For deaf children this integration policy had some special characteristics. Some schools were selected as special mainstream sites for deaf children to attend where there were two objectives: 1) the focusing of teaching resources (materials and personnel) in these schools

and 2) the grouping together of deaf children with hearing children to promote social interaction and avoid social isolation.

At this juncture it was decided that forms of communication other than oral language should be used in the classrooms. Two of these were signed Spanish and cued speech. From this point on we witnessed the closer collaboration between the educational administration and the Deaf community in the elaboration of materials in sign language and the training of teachers. Although the Deaf community was critical of the integration policy that existed, it was with these programs that deaf adults became experts in the eyes of the teaching profession with respect to Spanish Sign Language (LSE) and sign language training. Paradoxically, training professionals in Signed Spanish enabled hearing teachers to come in contact with the Deaf community and LSE. Also deaf adults collaborated with the educational administration in the development of training materials (MEC, 1989; 1993). Signed Spanish became a usual way of communicating between hearing parents, teachers and deaf children. Cued speech was also adapted to Spanish (Torres, 1988) and promoted as a way to improve the creation of phonological representations for words and then reading (Alegria & Leybaert, 1987; Leybaert & Alegría, 2002).

However, within a few years it became evident that it was extremely difficult for hearing teachers to implement visual communication systematically in a classroom of 20 hearing children and only 2 deaf children. In practice, visual communication through Signed Spanish and/or cued speech was being used in separate groups in the classroom or in special situations by speech and language therapists (SALTs). Deaf children were in classrooms where language was available, but not in fact accessible, with the result that educational integration was not meeting their academic needs or principles of normalization (Diaz-Estébanez & Valmaseda, 1995).

These changes occurred alongside other events: bilingual education was growing and results were emerging from schools in northern Europe (Lewis 1995), the first LSE publications emerged (Rodríguez, 1992) and an international conference was held in Salamanca on sign language research (Ahlgren, Bergman and Brennan, 1994). The Spanish Deaf community held large meetings during those years and a discussion

of the role of sign language in society, Deaf culture and linguistic recognition was made public. At this point, it is crucial to emphasize the role of our schools in restructuring themselves towards a different model of education. This included the incorporation of LSE into the teaching practices and also starting joint education of deaf and hearing students. This was in response to demands from parents for a better education for their deaf children. The changes towards educational bilingual models and towards the creation of contexts of co-enrollment were initiated, mainly, by opening the doors of deaf schools to hearing pupils (Apanse, 1998; cf., Antia & Metz, this volume; Hermans, Wauters, de Klerk, & Knoors, this volume). There was a redefinition of the schools as now co-existing in the same buildings used previously by deaf children with units of co-enrollment of hearing and deaf pupils together which generated a more diverse and rich educational context. In our country therefore co-enrollment and bilingual education were closely related from the beginning (Alonso, Rodriguez & Echeita, 2009). The Spanish experience from the outset had some special characteristics compared with other countries:

(i) Rather than waiting for a child's sign language development to progress before introducing the spoken or written version of Spanish, both sign language and spoken language, as a form of simultaneous bilingualism, were present in the classroom from the onset of a child's education.

(ii) It was considered crucial that deaf children had good early contact with peers and adult fluent users of both spoken and signed languages.

(iii) There was no official recognition of the sign language (this would not happen until 2007) nor was there a body of linguistic or psycholinguistic research on LSE until much later.

(iv) As the first bilingual schools started incorporating LSE, the number of deaf children receiving cochlear implants was growing and educational practices needed to take this into account. Bilingual education and CI were closely related from the beginning.

The sign bilingual education that we see today in Spain has not been directly through government policy making but instead bottom-up, from schools and the Deaf community. Without formal support,

standard guidelines or frameworks and the *laissez faire* attitude of the educational administration, the first bilingual education experiments were quite difficult (Morales-López, 2008). In our country, only two educational modalities are regulated: mainstreaming and special education. Mainstreaming is the most widespread. Typically this is where one or two deaf pupils join an ordinary classroom in an environment of oral communication, and they receive support from teachers for children with special educational needs and from speech therapists. Officially, bilingual education is regulated legally (Ley 27/2007). In this law, applicable nationally, it is stipulated that "the educational administrations will offer bilingual educational models, which will be of free choice for the deaf, hearing-impaired and deaf-blind students or their parents or legal representatives". However, in practice, there has been no application of this law in any of the 17 autonomous communities in Spain. It is not clear how many schools label themselves bilingual (Muñoz-Baell et al., 2011). Often if sign language is used at all, even minimally, it is termed a sign bilingual school. Morales-López (2008) looking at only Madrid and Barcelona described the bilingual education situation as continuing to be driven by bottom up policies rather than acquiring any official position, resulting in a kind of invisible policy of deaf education.

<1> Bilingual schools in the Madrid region

In this section we describe the educational practices in four schools in the Madrid community. The aim is to describe in detail what we are doing and what this educational experience involves. As in the rest of the country, deaf and hard of hearing children in Madrid are schooled primarily in mainstream classrooms. This usually happens in a typical school without specific resources for deafness, or in a more specialized mainstream school with some preference for hearing impairment, where there are one or two deaf children per classroom. From the existing four special schools for the deaf in Madrid, three of them moved towards bilingual education and then, slowly, towards co-enrolment education (15-20 hearing/5 deaf children per classroom). The four schools continue to run special units. They have, therefore, acquired a double identity or status: integration and special education. In order to place a deaf or hard of hearing child in special

education or in an integrated setting, a statutory assessment and a statement are required. This is carried out by a team comprised of different professionals such as educational psychologists, speech and language theapists, audiologist and deaf professionals, but parents must agree. Bilingual/co-enrollment education does not exist as an official option but in practice it is considered under the integration option.

The total deaf child population in Madrid at the time of writing this chapter was 597. The proportion of children going to the four bilingual co-enrollment schools is 24% (n=141), out of which 53% have cochlear implants (see Table 1) There are also 65 pupils in these schools who have additional disabilities or social disadvantages and who attend the special units but may also share some activities with the rest of the students. This shows a high degree of diversity in terms of student backgrounds in the schools.

INSERT TABLE 1 HERE

<2> Curriculum organisation in the bilingual schools

From the four schools that appear in Table 1, Piruetas covers the 0 - 3 years period and is the only one that has been using a sign bilingual and co-enrolment philosophy since its inception in 1999. The Sol, Ponce and Gaudem schools offer infant school (3-6), primary school (6-12 years) and special education (6-16 years). As described in the earlier section, it is important to recognise that when these schools were first set up they were schools for deaf children so when the move to co-enrolment occurred they 'opened their doors' to hearing children. This meant that the expertise in the schools was high, as they focused on deaf children from the outset (see descriptions in Alonso et al., 2009; Las Heras, 1999; Sanjuán & Pérez, 2005). In the practical organisation of the schools there is a close relationship between the decisions made concerning 'special education' and 'co-enrolment'. In this way management of the children is closely coordinated taking into consideration these two factors. As we outlined earlier, the approach of deaf education adopted in these schools is quite different from other countries. When all children enter the

infant stage of their education (0-6 years), they receive bilingual input directly and in a co-enrolled context. At the end of this period they are evaluated by a team of psychologists and language specialists and, in agreement with the family, future educational paths are planned for them e.g. continue in a bilingual and co-enrolment setting or another type of education setting.

In each bilingual and co-enrolment classroom there are 5-6 deaf children and 15-20 hearing peers with two hearing co-teachers. This is not just physical sharing of a classroom but also the curriculum and the language of education, meaning deaf/hearing children share the everyday life of the classroom. Having other deaf and hearing peers in the classroom enables children to develop their own identity.

<2> What do the schools teach?

All the children (deaf and hearing) receive the same curriculum. Each school has to develop their own curriculum taking into account their own learning objectives and how these are taught in both sign and spoken language. It is worth noting that although ideologically it is held that LSE has the same status as Spanish, officially no such recognition exists in the curriculum. The infant stage of education (0-6 years) is split into two age groups (0-3 and 3-6 years). This period of educational programming is optional in Spain, but we have found that most parents do in fact send their children to schools at this age and especially so when their children are deaf. It is an invaluable period as the schools can work with parents of the children from their early age on communication and use of hearing aids/CIs. From 0-3 years we do not teach content subjects but instead ‘fields of experience’ (e.g., a special focus on language development). In the second stage (3-6 years) the curriculum is organised around areas. One of the main subjects is “Communication and Representation” which normally would focus on spoken language; however, in the bilingual schools, we include signed and spoken language because for some deaf children LSE is their main mode of communication.

In the primary school (6-12 years) the subjects are more diverse: including science, art, mathematics, physical education, and foreign languages. Here the focus for teachers is on how to deliver

this curriculum in both spoken and signed language in the same classroom. This means deciding on what subjects are taught by which language(s). In all the primary school years we consider LSE to be a communication and educational tool but it has also become a new curriculum area. In order to teach LSE to children we collaborated with the National Center for Deaf People in Spain to develop a teaching guide (CNSE, 2006). The LSE curriculum includes learning objectives, content and evaluation criteria adapted to suit the different levels of training with the hearing and deaf children. As with other aspects related to sign language in schools, while LSE is officially recognised, this curriculum is not universally adopted. In the next section we will attempt to explain what we mean by ‘curriculum for all’, which is a difficult concept as we have different levels and two languages.

<2> How do the schools teach? Methodological issues in increasing participation and breaking down barriers.

Though each of the four schools has their own methodological approach, they all share the ideology of inclusive education. Inclusive education, which is included in international guidelines (UNESCO, 2005) as well as in our national laws, refers to a philosophy of educating all students together in regular or general education settings regardless of the presence or absence of disabilities. The philosophy and policies supporting it assume that methods and services will be used to provide for the varied learning needs of individual students. Inclusive education is a broad term which refers to a transformational process that promotes an educational system aiming to deliver quality education and that may be adapted to support learners with diverse needs. We follow the inclusive educational practices as discussed in the literature (Ainscow, Booth and Dyson, 2006; Dyson & Millward, 2000; Echeita, 2006), which see learning potentials as not determined solely by personal conditions (e.g. deafness, family or types of aid) but also by the learning contexts where pupils are. The teacher’s responsibility is to remove barriers to communication and to enable all children to learn (Alonso & Echeita, 2006).

Traditionally in Spain, teachers use the same textbook with all the children in a classroom. This practice implies that there is homogeneity in the learners, which some researchers consider a myth (Pujolas, 2008). Classrooms are full of different children, including deaf children and such a composition means diversity. If we add two languages and two teachers working together, we have to devote a great amount of time to organizing our teaching. Each of the schools in our study developed their own teaching methods but they all aim to remove barriers to learning and promote maximum participation by deaf children in the classroom.

The main changes the schools introduced focused on accessibility and diversity. When looking at deaf children in a bilingual classroom shared with other hearing children, two main issues have to be addressed. The first is what barriers exist for the child to participate and this is most commonly about language ability. The second issue is barriers to effective learning and this most commonly is about the teaching practices in the classroom:

i. Accessibility

Having two languages means all the children can access the curriculum but this does not mean both languages are in use all the time in every situation. Simultaneous and constant use of both languages is in fact a misconception that we encounter when we talk about sign bilingualism. Centers develop linguistic plans which define how each language is used in anticipation of which children are involved in each of the activities. This means a lot of time is needed in planning. For example, in the infant school after the second term when the general assembly is already part of the learnt daily routines, conversations or questions about “Who is here today?” or “Who has not come?” could be delivered in spoken language. Another example from the primary school age experiences would be where there are 3 deaf children with a CI and 2 deaf children without a CI working together in the same classroom. The teachers have to decide whether the general instructions from the teacher include Spanish and LSE. When activities takes place in a small group, some children with a CI will be working only in spoken Spanish and other groups with children not wearing a CI will be using LSE. There are thus moments when both languages are

present for everybody (e.g. in large group activities) and other moments when only one language is adopted.

How is accessibility of both languages ensured? With spoken and written Spanish we use appropriate equipment (e.g., sound field frequency-modulated systems) and systems such as visual phonics (Juarez, 1985) or cued speech. This practice is based on evidence from language development and reading (Alegria & Dominguez, 2009; Dominguez, Rodriguez & Alonso, 2011; Leybaert, Bayard, Huyse & Colin, 2012; Santana, Torres & García, 2003).

We attempt to give LSE the same status as Spanish at the centers. Accessibility of LSE means we have hearing co-tutors who are fluent signers and deaf staff working together. The signing co-tutor takes responsibility for the use of LSE in all activities (except those where we have plans for using spoken language in isolation). This could be in general assemblies, classroom zones concentrating on mathematics, symbolic play, literacy and investigation projects (Pérez, Herrero & Pérez, 2008). Access for all children is thus guaranteed by two co-tutors in the classroom all of the time. Each teacher works in different zones and with different languages following the bilingual principle “one person – one language” (Barron-Hauwaert, 2004; Saunders, 1988). This interaction stimulates conversations, hypothesis testing and exchanges of opinions where the students engage themselves in negotiating the content of classroom discussions (Ruiz, 2000). This means children are learning language by practically interacting with each other, which resembles the natural processes of language acquisition. This practice means teachers have to pay attention to what activities they are using to promote language learning. The activities should encourage meaningful and real communication and interaction where children learn how to use either LSE or Spanish to perform these functions (Hymes, 1972)

ii. Diversity

While diversity in learners and the possibility of multiple intelligences exist (Gardner, 1983), it is also crucial to accept the fact that all children, deaf and hearing, may bring different learning

strategies to the classroom. The methodology used is based on the ideas of Piagetian constructivism and co-operative learning (Johnson, Johnson & Holubec, 1993; Kagan, 1992). This approach allows us to break down the structure of a conventional classroom and use activities that all children can take part in, as these activities may have several levels of difficulty and ways of solving similar problems (UDL – Universal Design for Learning Center for Applied Special Technology (CAST) 1990)

The topics taught are often chosen by children themselves (research projects) and are used to induce the children to elaborate on their language and thinking. Each activity however has to have different levels so that all children can be accommodated. An example of this is our work zones. Imagine four zones (mathematics, art, Spanish and LSE). In each zone there are 5 children (deaf and hearing) with a variety of activities planned by the teacher. For mathematics, for instance, the more diverse in terms of the children's abilities, the more different activities can be planned for the week. We see bilingualism as a continuum (Pearson 2009) in which each child is encouraged to achieve his maximum potentials in both languages. As such, the planning of both languages to be used is not a copy across all activities and contexts; instead it needs to be planned depending on what skills each child has in each classroom group. During each school year the co-tutors plan which language will be used in which zones related to the profiles of children in the classroom. Because there are two teachers each can look after their own zone and language.

By following this social and cooperative learning we see that both deaf and hearing children can access the same curriculum. The added benefits of this approach for deaf and hearing children are mutual: hearing children acquire signs and deaf children feel part of the wider group. Both groups learn to respect the intrinsic differences of people in their class.

<2> Specific subject areas for deaf children

The way we have organised the classroom practices means that all children can both participate and learn; however, this is not sufficient on its own to ensure that a deaf child improves comprehension and

production of spoken and written Spanish. Our intervention is based on what we term: linguistic planning. Each of the four bilingual schools in Madrid therefore develops linguistic planning unique to the deaf children in their schools, which can vary between schools but activities may include: spoken language sessions, (using cued speech, **signed Spanish** and visual/manual phonics), written language workshops, extended activities focusing on meta-phonology or speech and language therapy for improving auditory discriminations.

With respect to written Spanish we place a great emphasis on early exposure to different type of written texts (newspapers, underground tickets, narrative and expository text, etc.). In our work on written language development we focus on the constructivist approach (Ferreiro & Teberosky, 1979) and use established psycholinguistic models of reading (Alegría 2003) to guide interventions for deaf children's meta-phonological awareness. The constructivist perspective for reading and writing puts a priority on the meaning and function of what children are reading. Following this idea we encourage children to think about what it means 'to read and write'. An example of how we integrate both approaches- constructivist and psycholinguistic- is in order here. Using the idea of a menu, we ask the children to read or write about what they will be eating that day (providing meanings and functions of reading); then we work on their metalinguistic skills, focusing the child on segmenting words. In this last aspect we use visual phonics, cued speech and a sequence of tasks: counting, identifying, omitting or adding syllables and phonemes (Dominguez, Rodriguez & Alonso, 2011).

Additionally all the deaf children in our schools also receive much oral language intervention outside the bilingual schools.

<2> People involved in the work.

We could not carry out all of the previous types of activities without the appropriate team of professionals in place. These include deaf LSE specialists, two co-tutors per class, SALTs and interpreters.

Deaf LSE specialists. Deaf LSE specialists are trained in LSE teaching and some are also qualified teachers or infant educators. Across the 4 schools we have 14 of these professionals and they are contracted staff to the school. While this aspect of schools has existed for several years it is only very recently that a job description has been put forward by the educational administration which includes: teaching LSE to deaf pupils, teaching LSE and deaf awareness to hearing pupils, teaching/training of LSE and visual communication for families, training teachers in communication and visual strategies for effective learning and finally promoting deaf cultural activities to the wider school staff.

Co-tutors. Each classroom has two hearing co-tutors who act as language reference points for children. They are always in the classroom except when specialist provision is happening (e.g. English or Music classes). One uses LSE the other Spanish to communicate with the children as well as to teach. Normally they have a background in SALT or LSE. They share the same status in the classroom, which facilitates extremely close collaboration in teaching and planning. Both co-tutors plan the subject area (mathematics, science etc) together, as well as teaching them. This means that the signing teachers are not interpreters nor are they interpret for each other, instead, each teacher is teaching according to the level of the children in the group.

SALTs. Speech and language therapists (SALTs) are common figures in mainstream schools with deaf children as well as the bilingual schools. Their responsibility is to guarantee the spoken and listening stimulation required for children's speech and literacy development. Again they have a close collaboration with co-tutors.

Interpreters. In infant and primary levels, interpreters work only with the deaf and hearing adult staff in internal meetings or contact with families. In secondary education and beyond they take a more active role in the classrooms.

Up to this point, we have described the bilingual schools in order for the reader to be able to visualise the activities, organisation and staff. However we also have to recognise that there is a hidden curriculum that is more difficult to describe in words. What we mean by this is that our schools need to

constantly work on enabling children to develop and maintain a sense of competence and positive self-image (Power & Grez, 2011). With the details of the educational framework, curriculum content and practices explained, we move to some description of the evaluations we have carried out.

<1> An investigation into the outcomes of bilingual education in Madrid

From other chapters in this volume (e.g., Marschark & Lee; Walker & Tomblin), it will be clear that a systematic review of the impacts of sign bilingualism on deaf children's development is sorely needed, in order to anticipate future practices especially with the widely adopted practice of early cochlear implantation. With this in mind, we have been carrying out several projects investigating spoken language and sign language development in children with a cochlear implant in sign bilingual schools. In this section we describe this work in the context of wider research in the same area.

In recent years, most deaf children (even with deaf parents) are receiving an early cochlear implant. . As Knoors and Marchark (2012) described, this widespread practice in other countries has influenced the popularity of sign language in educational settings and greatly increased the amount of research into spoken language development in deaf children (Geers et al., 2011; Manrique et al., 2006; Niparko et al., 2010). However, there are very few studies of early spoken/sign language development in deaf children in bilingual schools. Some Swedish researchers (Preisler Ahlström & Tvingstedt, 1997, 2005) found the early language modality most preferred by deaf children with cochlear implants was sign language, and this reduced over time but carried on being used in situations where complex language was required. They reported that children with better levels of language had elevated scores in both modalities. Wiefferink, Spaai, Uilenburg and Vermeij (2008) examining Flemish and Dutch children found better spoken language development (intelligibility, receptive and productive vocabulary) in the spoken monolingual than bilingual contexts. Complexity of sign language syntax, measured through the mean number of morphemes per utterance (MLU) did not progress in these Dutch bilingual children. According to the authors, this might be explained by the fact that the children were more exposed at home to spoken

language than to sign language (see Walker & Tomblin, this volume). Jiménez, Pino and Herruzo (2009) pointed out that advantages or disadvantages of bilingual education for deaf children with cochlear implants depend on what specific areas of language are being evaluated. In addition to having few studies on this topic, those that were cited fail to define precisely what type of bilingual education is in focus.

As described earlier, the schools where the current study is based are sign bilingual and co-enrolment, meaning both deaf and hearing children are taught in Spanish and LSE from native users of both languages. In terms of bilingual development, the children in the four Madrid schools have all the necessary conditions to engender good outcomes. What have we observed? During the 2010-2012 school year, we evaluated 17 children aged 0-6 years on their language and social emotional skills. While this sample is small, it represents the entire group receiving bilingual education in these schools at the point the study started that had no additional disabilities, parents used Spanish or LSE and all were implanted before 2 years of age (12 unilateral, 4 bilateral, and 1 a trunk implant). The advantage of the sample was that they had arrived in these schools from an early age and not after several years being in other types of schools, which is often the situation with deaf children who come into a sign language environment because other interventions have failed. We were interested in both vocabulary and grammar in both LSE and Spanish but because the age of the children varied we were unable to test all children on all of the same tests. We also carried out preliminary investigations into their social-emotional development. We illustrate in Table 2 the sets of assessments carried out; and in Table 3 the numbers of children assessed.

INSERT TABLE 2 HERE

INSERT TABLE 3 HERE

We first present results on Spanish and LSE separately then combined. For more detailed results see (Pérez, Valmaseda, De la Fuente, Montero, Mostaert, in press; Mostaert, 2012).

<2> Spoken Spanish skills

Audition. We used the parent questionnaire Little Ears (MED-EL) to give us information about the children's auditory behaviour 2 years after cochlear implantation. From 11 children tested 10 had auditory development above their hearing age with one exception being the child with a trunk implant.

Spoken Spanish. Spanish vocabulary and grammar were assessed with four tests determined by the child's chronological and hearing age: the Spanish CDI (López-Ornat et al., 2005) for vocabulary between 8-30 months. Thal, Desjardin and Eisenberg (2007) demonstrated this test was appropriate for deaf children up to hearing age 36 months. We also used the PPTV-III Peabody (Dunn, 2006) for vocabulary after 30 months. For children older than 4 years we used the K-Bit (Spanish version: Cordero & Calonge, 2000) but only for expressive vocabulary. For Spanish grammar we used the CEG (Mendoza, Carballo, Muñoz, & Fresneda, 2005), which is suitable for children between 4-11 years.

Children tested on the Spanish CDI for expressive vocabulary (n=12) had a mean percentile score appropriate for their hearing age (mean percentile 65). However, there was variability: in 8 out of 12 of these children, their vocabulary scores were above their hearing age equivalents, 2 at this level and 2 below. Thus, these children have vocabulary development in Spanish between their chronological and hearing ages (similar results reported in Duchesne, Sutton, Bergeron & Trudeau, 2010).

Older Children (n=11) were tested on comprehensive and expressive vocabulary using the PPVT and K-Bit (n=11). The scores were within the normative range (see Table 4) with slightly higher scores in expressive vocabulary, similar to Geers et al. (2009) and Duchesne, Sutton and Bergeron, (2009). This pattern is atypical, as hearing children's receptive vocabulary normally surpasses their expressive vocabulary. The reverse trend has been reported in previous research with deaf children (Moeller, 2000). It also seems to be the case in children who received CI early. These results might be related to what

Geers et al., (2009) pointed out, as language teaching strategies that put a lot of emphasis on naming. The same 11 children were also tested on Spanish grammar with the CEG. We see in Table 4 that mean scores, compared with chronological age norms are within normal percentile ranges (percentiles 16-85) but in the lower ranges and with a lot of variability: across 11 children tested 5 performed at chronological age, 2 at hearing age and the other 4 below hearing age. These results while positive, support the findings that grammar is the most difficult part of the spoken language to be mastered by deaf children (Inscoc, Odell, Archbold & Nikolopoulos, 2009) even in deaf children with early implants and in early sign bilingual environments.

INSERT TABLE 4 HERE

We followed up the children at a second time point allowing us to investigate whether this development trajectory was maintained. In 6 children we were able to test spoken Spanish 12 months later with the CDI. All the children made significant gains over time, with high percentiles for hearing age during a two time period (71.5 at Time 1 and 61.5 at Time 2). In 9 older children tested 12 months later with the Peabody and K-Bit (the CDI was not age appropriate) there was the same positive trajectory. Scores were within the normal chronological age range at both time points but again expressive vocabulary was better than receptive.

<2>Spanish Sign Language (LSE) skills

As in many other countries there are no standardised assessments of sign language in Spain. One of the objectives of our work has been to develop such methods. In the following results therefore we report raw scores instead of norms. The Inventory of LSE vocabulary has been developed based on existing CDIs for ASL (Anderson & Reilly, 2002), BSL (Woolfe, Herman, Roy & Woll, 2010) and spoken

Spanish (López Ornat, et al., 2005).¹ To evaluate LSE grammar we also piloted an adapted BSL receptive skills test for LSE (Herman, Holmes & Woll, 1999) which is aimed at children aged 3 - 11 years.

Here we report LSE vocabulary development over two time periods (12 months apart) for 8 children aged 23- 42 months (7 with hearing parents). The sample had between 15-24 months exposure to LSE. We found a significant development in LSE across time periods and contrary to the spoken Spanish tests reported previously, better receptive than expressive scores (see figure 1).

INSERT FIGURE 1 HERE

It appears that when the language is fully accessible, assessments reveal typical developmental processes and comprehension precedes production. However in line with evaluation of Spanish there was a good deal of variability between children. As an approximate indicator of how fast they are acquiring LSE, we compared the deaf children with hearing and deaf parents' sign exposure age (how long they have had learning LSE), to the native signer scores reported for BSL. While this cannot be an exact comparison, we observed that the 3 native signers have an equivalent lexical development to their BSL native signing peers and positively the 7 non-native LSE learners have vocabulary scores above sign exposure age. Thus we observed a similar LSE vocabulary development, as that described for their Spanish, some variability but scores between the age of exposure and chronological ages.

For LSE grammar we used the pilot LSE receptive skills test with 9 children over a 12 month period. At the first assessment the children had mean age 5;1 and mean exposure time to LSE of 3;6. Contrary to Wiefferink, et al., (2008) who did not observe progress in the children's syntax in bilingual contexts, we observed a statistically significant development ($p < .01$) of LSE grammar over the two time periods tested (see table 5)

¹ This inventory will be standardized by the University of Sevilla in a research project financed by the Junta de Andalucía (Reference: SEJ-7417)

INSERT TABLE 5 HERE

Therefore, although these children are not acquiring LSE from their parents but from the school, they have a good developmental trajectory of the language in both comprehension and production.

<2>Comparison between the LSE and Spanish

Next we carried out some more comparative analyses of the development of Spanish and LSE. Studies on simultaneous bilingualism in hearing children indicate that if exposure to two languages with a rich and proportional input in quantity and quality, and if both languages to which they are exposed have the same status, both languages will develop in a balanced way. In the case of the children in our schools things are somewhat different as most of the children have hearing parents who do not sign well and the children do not get their first exposure to LSE until after 2 years. Also the status of LSE is not the same as Spanish. Even with these differences we are interested if deaf children with early CI and LSE exposure will develop in similar ways to children exposed to two spoken languages.

In our assessments of vocabulary in Spanish and LSE we observe both LSE and Spanish expressive vocabulary develop side by side. It is not the case that exposure to LSE negatively affects the growth of Spanish vocabulary. Similar results are reported for deaf children in the UK (Woll, 2013). In Figure 2 we saw data from 6 children for two time points with 12 months apart. The mean chronological age at the first time point was 2;8 and mean age of initial exposure (the mean age at which children initiated his contact) to LSE and Spanish was 1;7. While the two languages make significant gains over time there is a shift across time periods in the vocabulary levels. First LSE is dominant, but this changes to Spanish in the second assessment. We believe this is due to the educational context the children are learning in (See Figure 2).

INSERT FIGURE 2 HERE

Several researchers describe that evaluating language in bilinguals can sometimes disfavour these children if *conceptual* vocabulary is not considered (Pearson, 1998; Oller, 2005; see Rinaldi et al., this volume). As typically is the case, bilingual children in each of their two languages initially produce less vocabulary than their monolingual peers, it is advisable to combine scores for the two languages. Combined scores represent the child's total conceptual vocabulary where some concepts are presented in both (doubletons) while others only in one language (singletons). Therefore, we combined singletons and doublets in a sample of 11 children (8 DoH and 3 DoD). In Figure 3 we see the children assessed, are ordered from left to right according to hearing age and age of exposure to LSE.

INSERT FIGURE 3 HERE

In general, as mean scores, there are no differences in lexical size between Spanish and LSE but conceptual vocabulary is larger in all children even in the 3 native signers. In the same figure we see children with less hearing age in months have greater LSE; however, this dominance shifts to spoken Spanish at 24 months hearing age, as described previously. This shift occurs also in native signers but not in the one child with the trunk implant (N6).

<2> Social-emotional skills

We carried out some preliminary assessments of social-emotional skills using the Profil Socio-Affectif (PSA) in the French adaptation (Dumas, et al, 1997). Previously, this measure was used as a screening instrument by Virole, Bounnot and Sánchez (2003) with children who had received a CI, and also in Spain by Silvestre (2008) in a follow-up with 54 deaf children with and without CI. Virole et al (2003) reported 58% of children had normal development, 13% had major difficulties and 47% at least

one difficulty across the different scales. The test is an 80-item teacher/caregiver rating scale that assesses social competence, affective expression and adjustment. We used it to describe the children's behaviour but also to focus the attention of teachers and parents not only in language but in the child's adaptation to and functioning within his or her environment. The test gives teachers a child's profile of strengths and weaknesses, and indicates which the focus areas for intervention are. Scores between 38 and 63 are in the normal range, and below 37 represent difficulties. Though the results must be taken with certain caution (since French norms of the test were used), test scores in two global scales (social competence and general adaptation), reveal that the 17 children evaluated had good social-emotional development (the means for general adaptation was 53; social competence: 51 points and only one child presented difficulties scoring 38 and 35 points respectively; see Figure 4).

INSERT FIGURE 4 HERE

Thus we can conclude in this section that the children we evaluated are well adapted and able to deal with the social-emotional demands of their environment well enough. There is an interaction between social-emotional development and bilingualism. As soon as the children begin school at around 2 years of age, they are able to access LSE and using signs can establish important early interaction with other children and deaf and hearing adults. Virole et al. (2003) also noted that an early cochlear implant provokes a perceived certainty in hearing parents that early language can be heard and developed, which can lower anxiety and facilitate more natural interaction in the family

<1> Conclusions and future directions

<2> Bilingualism

In our assessments we can see good development of language, even within normal ranges, however this is coupled with much variability between children and also between aspects of language evaluated.

What can this tell us about the type of context a bilingual school offers a deaf child? With the arrival of early cochlear implants and early exposure to LSE the children in our schools have the best possibilities of achieving the highest levels of competency of both languages possible. We observe that children develop abilities in both languages between their chronological and hearing ages. This implies that positively, the children are where we expect them to be but also it gives us some idea of the distance needed to travel in order for the child to be at the level comparable with his/her hearing-age peers and for the types of tasks the teacher is asking the child to understand and master.

Initially we observed a preference for LSE over Spanish, which at 2 years after implantation, began to invert. This early sign preference is probably due to the greater accessibility deaf children have to the visual modality early on. Early sign exposure means children and parents/professionals are not losing valuable time, waiting for the cochlear implant to be functional or auditory stimulation to become interpretable, instead concepts are developing and crucially communicative skills are being honed. Once the implant begins to facilitate spoken language development, the child already understands the referential nature of language and the need to pay attention to interlocutors when they are speaking and use the pragmatic inferences they have acquired previously via LSE. This 'sign language bootstrapping' is very important in early and rich bilingual environments. In our schools the majority of conversation partners are hearing and the opportunities to acquire Spanish are multiple and varied but crucially this is not the only option. If the quality of the input from the implant is temporarily sub-optimal for technical reasons, interaction and education can continue. The advantage of our bilingual centers needs also to be monitored as it could be possible the oral language environment is neglected. Our work concentrates on keeping both quantity and quality of the two languages at an optimal level. This implies bilingual environments have to ensure good acoustic conditions, create a culture of respecting conversation turns and maintaining the use of technical aids.

<2>Variability

Vocabulary development is better than grammar for deaf children in our bilingual sample as well as for deaf children educated in other monolingual 'oral' schools (Duchesne et al., 2009; Geers, Nicholas & Sedey, 2003; Geers et al., 2009; Inscocoe et al., 2009). Spanish grammar is difficult to hear and produce, with important grammatical elements and function words appearing at the end of words and sentences as temporally brief phonetic material. These elements are also typically difficult for hearing bilingual learners in their second language (Paradis, Genesee & Crago, 2011). This implies that sign bilingual schools should make grammar development a main area of development through explicit activities.

While we can control much of the variables that affect individuals' development there remains variability perhaps stemming from natural differences in the child's development, functioning of the cochlear implant, social differences between the families and possibly educational differences between schools. Variability tells us that we need to incorporate careful observation of progress and put in place early and targeted interventions before chronic delays appear. Persistent delays are a possible sign of language impairments (Hawker et al., 2008; Mason et al., 2010; Monfort, 2006). The key to early interventions is flexibility in the educational responses for each child. This continues to be a major challenge for the success for the bilingual schools.

<2>Future challenges

Bilingualism in sign language and spoken language is a delicate balance. The medical perspective is a powerful one in the lives of deaf children. Most parents today go ahead with early cochlear implants with the strong desire that their children become fluent speakers. Professionals working with deaf children also put great emphasis on spoken language skills. For many years there has been a debate for one modality over the other with signing considered a failure in many schools. We must move on from this impoverished argument. It is time to consider that whatever linguistic skills a child can obtain (mono/bi/tri lingual) these are all valuable and will be appropriate at different points in a child's development. Changes to Madrid schooling policies are affecting how we think about sign bilingual

education. The wider educational establishment is aiming for children to be early learners of English. This policy has also been introduced into schools where deaf children are educated meaning to 30% of the school timetable is in English. This will greatly affect the planned careful balance of spoken language(s) and LSE, as well as affect the involvement of parents (mostly non-English speakers) in deaf education. In general it is necessary that the bilingual centers have more integration and guidance from the policy makers above us including legal support.

<2> Moving forward

In writing this chapter we were faced with several issues relevant to the general discussion about the lack of evidence-based practice in deaf children's bilingual education (Knoors & Marschark, 2012). We were faced with different starting points and ways of thinking about deaf children. We had to find a consensus for writing about both research and practice. This was not without challenges and involved a lot of discussion about how research and educational practice could link up more. It also involved some translation of thinking between the two paradigms for researching development: language development and classroom learning. In much published research on deaf children where the focus is language and cognitive development many researchers use a cognitive or psycholinguistic framework to pose question and do research. This means that professionals in education, while working within frameworks that stem from the work of pedagogical researchers, models and theoretical processes of learning and teaching, are not familiar with the large amount of psychology of deafness research that has been carried out (e.g. Marschark & Hauser, 2008). Therefore there is a distance between what researchers do and how educational professions carry out their work in isolation of each other (see Knoors and Marschark, 2014).

One area that is very much in need of further investigation is the actual learning processes that occur in the classrooms of deaf children in bilingual schools. If more researchers were able to tackle these questions in collaboration with educational professionals we would have more meeting points. There is a model already existing for this type of collaboration in the field of reading research. Cognitive science

researchers have moved their focus from psycholinguistic models of reading to also look at the classroom practices that promote reading in children (Sanchez et al., 2010; Snowling and Hulme, 2008). The process of translation and searching for bridges might be a reflection of the gap some researchers and educationalists feel exists. We have to work together more in order to arrive at realistic objectives and relevant findings of research but this does not happen automatically. Part of the current absence of research evidence on bilingual educational for deaf children, may be a reflection of the difficulties in getting different groups of professionals speaking together in mutually understandable and even bilingual ways.

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Table 1. Names of schools and census 2013

NAME OF SCHOOL	BEGINNING YEAR AS A BILINGUAL-COENROLMENT SCHOOL	0-3 years (INFANT SCHOOL)	3-6 years (PRE-SCHOOL)	6-12 years PRIMARY	TOTAL	With Cochlear Implants
PIRUETAS	1999	6	-	-	6	2
SOL	2000	-	18	43	61	35
PONCE	2004	-	13	33	46	21
GAUDEM	2008	1	10	17	28	17
TOTAL		7	41	93	141	75

Table 2. Assessment Tools & number of DHH children tested

Areas evaluated for Spanish	Test (number of children tested)	Norms available?	Areas evaluated for LSE	Test (number of children tested)	Norms available?
Audition	Little Ears (11)	Yes (0-24 hearing age)			
Receptive vocabulary	Peabody (11)	Yes (from 2;6)	Receptive vocabulary	LSE inventory (13; 8 at two time points)	No
Expressive vocabulary	CDI (12) K-Bit (11)	Yes (8-36 months) Yes (from 4 years)	Expressive vocabulary	LSE inventory	No
Receptive Grammar	CEG (11)	Yes (from 4 years)	Receptive Grammar	LSE grammar test (13; 9 at two time points)	No
Social-emotional evaluations	PSA (17)	Yes , French norms (2,5-6 years)			

Table 3. Details of which test each child took

Test /Children	LITTLE EARS	CDI LO	PEABODY	k-BIT	CEG	INVENTORY LSE	GRAMMAR TEST LSE	PSA
N 1	1		1	1	1	1	1- 2	1
N 2	1	1-2	1			1-2	1	1
N 3		1-2	1	1		1-2	1	1
N 4	1	1-2	1	1	1	1-2		1
N 5	1	1-2				1-2		1
N 6	1	1-2	1	1	1	1-2		1
N 7			1	1	1		1- 2	1
N 8			1	1	1		1- 2	1
N 9	1	1	1	1	1		1- 2	1
N 10	1	1-2	1	1		1-2	1	1
N 11	1	1	1	1		1	1- 2	1
N 12		1	1	1	1	1	1-2	1
N 13			1	1	1		1-2	1
N 14	1		1	1	1	1-2		1
N 15	1	1	1	1	1	1	1-2	1
N 16	1	1	1	1	1	1	1-2	1
N 17			1	1	1-2	1- 2	1	1
TOTALES	11	12 (6 at two time points)	11 were tested on these 3 tests			13 (8 at two time points)	13 (9 at two time points)	17

1=1st assessment; 2=2nd assessment after 12 months

Table 4. Performance of 11 DHH children in vocabulary and receptive grammar in Spanish

Vocabulary				Grammar	
Receptive		Expressive		Receptive	
CA	HA	CA	HA	CA	HA
M:18,47	M:60,46	M:37,09	M:65,96	M:16,73	M: 29,44
SD (23,25)	SD (37,88)	SD (33,80)	SD (34,00)	SD (22,28)	SD (31,65)

M=mean; SD=Standard Deviation; CA=chronological age; HA=hearing age

Table 5. LSE receptive skills test in 9 children

% Correct items	
Time 1	Time 2
M:54.72	M: 67.22
SD (17.96)	SD (12.40)

M=mean; SD=Standard Deviation

Figure 1. Percentage on LSE vocabulary in 8 children

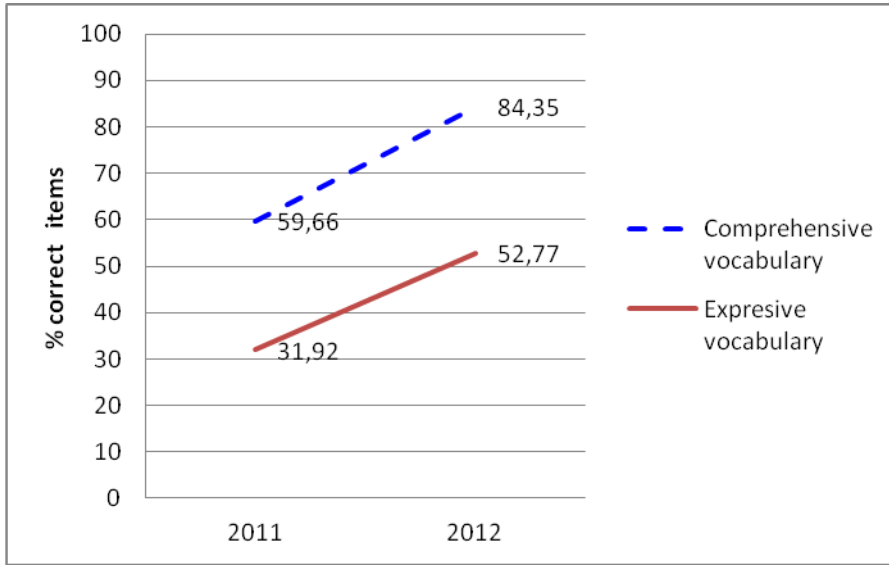


Figure 2. Development of Spanish and LSE in 6 children with CI.

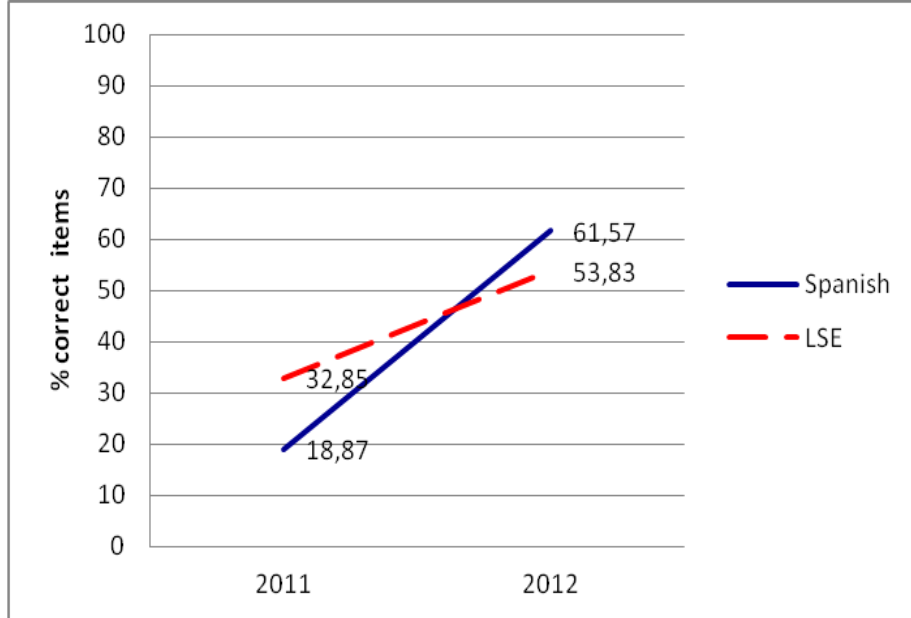


Figure 3. Number of signs, words and conceptual vocabulary in each subject

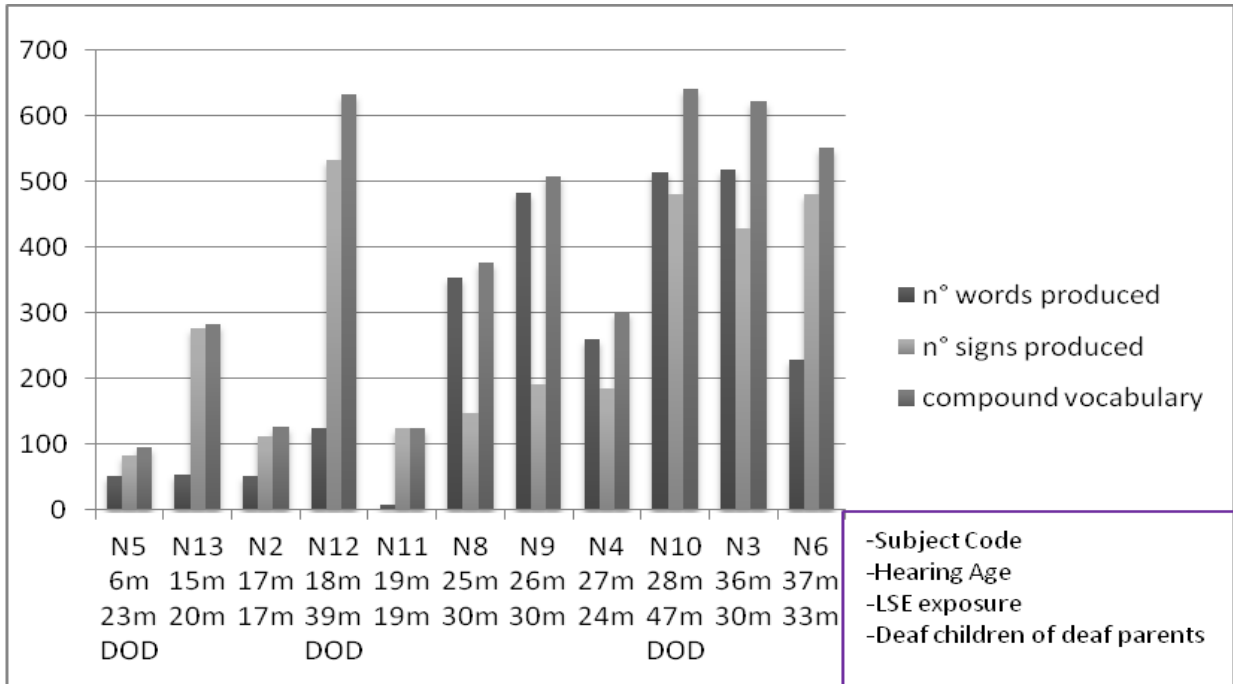


Figure 4. Scores of 17 CI children in the PSA task

