MANAGING COMMUNICATION OF STUDENTS WITH COCHLEAR IMPLANTS IN SCHOOLS FOR THE DEAF: PROFESSIONAL PRACTICES

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Abstract

Despite the large trend for mainstreaming children with cochlear implants (CI), a considerable number either with or without additional disabilities, attend schools for the deaf today. The purpose of this study was to address approaches and current practices, inter-disciplinary involvement and challenges within schools for the deaf for managing the communication needs of students with CI. Focused semi-structured interviews of school personnel were used for documenting current practices and drawing out areas of concern. Several differences emerged across schools but also between past and current practices in managing the communication of students with CI. These included management of technology, SLP involvement, instruction models, student re-grouping, and modifications in communication mode in teacher-student interchange. Challenges related to technology, interactions with other professionals and carriers and reaching the student's communication potential endowed by cochlear implantation are commented upon. The importance of an inter-disciplinary approach and the school's orientation are discussed as poles of the managing process.

Introduction

Cochlear implantation in children with profound, pre-lingual hearing loss leads to significant improvements in speech perception, speech production and spoken language (e.g. Fagan & Pisoni, 2010; Govaerts, De Beukelaer, Daemers, De Ceulaer, Yperman, Somers, Schatteman & Offeciers, 2002; Hammes, Novak , Rotz, Willis, Edmondson & Thomas, 2002; Svirsky, Robbins, Kirk, Pisoni & Miyamoto, 2000); especially in cases of early implantation which is nowadays the predominant choice for remediating severe and profound deafness in most developed countries (Connor, Craig, Raudenbush, Heavner, & Zwolan, 2006; Cosetti & Waltzman, 2012; Geers, Nicholas & Sedey, 2003; Hyde, Punch & Komesaroff, 2010; Nikolopoulos, O'Donoghue & Archbold, 2006; Niparko, Tobey, Thal, Eisenberg, Wang, Quittner & Fink, 2010; Yoon, 2011).

Many studies have shown that the majority of children with CI attend mainstream schools with or without provision of special services. Hence, they receive instruction in spoken language (Allen & Anderson, 2010; Eckl-Dorna, Baumgartner, Jappel, Hamzavi & Frei, 2004; Geers, Tobey, Moog & Brenner, 2008; Moog, Geers, Gustus & Brenner, 2011; Percy-Smith, Caye-Thomasen, Gudman, Jensen & Thomsen, 2008; Spencer & Marschark,

2003; Zwolan & Sorkin, 2004). However, despite the large trend for mainstreaming of children with CI, a significant portion of these students attends special classes or schools for the deaf today (Allen & Anderson, 2010; Christiansen & Leigh, 2004; Zwolan & Sorkin, 2004). Christiansen and Leigh (2004) reported that based on 439 parental reports, 58% of children with CI were fully or partially mainstreamed whereas another 28% of this sample attended self-contained classes and residential schools for the deaf, the latter comprising 15% of the total sample.

One major difference between mainstream and schools for the deaf is the communication method employed by the school community, during instruction and in socialization. Regarding the preference of communication method, studies have shown that the majority of children with CI used spoken language as their primary means of communication (Eckl-Dorna *et al*., 2004; Sorkin & Zwolan, 2004; Zwolan & Sorkin, 2004) that is 64%-68.8%, whereas a smaller number used total communication, i.e. communication via sings, natural gestures, fingerspelling, body language, listening, lipreading, speech and writing, .namely 21.9%- 30%. Not surprisingly, a very small percentage of children with CI used American Sign Language (ASL), 3%, or Cued Speech, 2%. Apparently, these students with CI attended a State School for the Deaf (Zwolan & Sorkin, 2004).

Recently, more research has focused on the effectiveness of communication of children with CI within the mainstream school setting where difficulties with oral communication were reported by parents , even through the adolescent years (Bat-Chava Martin, & Imperatore, 2014; Jachova & Kovacevic, 2010; Rich, Levinger, Werner, & Adelman, 2013). Moreover, older students, adolescents with CI, reported themselves that they faced difficulties in managing communication in mainstream classrooms, despite their good academic performance (Rich *et al.*, 2013). Although they preferred to socialize with hearing peers instead of hard-of-hearing ones, a few had expressed feelings of loneliness, several reported difficulty in participating in class discussions and in conversations with peers, and most of them reported that they seek help from teachers and peers. Finally, in a case study of a 12-year old child with CI, via a 12-month period of focused observation in a mainstream class, problems occurred with teacher-child communicative interactions and inconsistent child participation in class (Jachova & Kovacevic, 2010). A few teachers did not make eye contact with the student, nor did they provide modeling of the desired behavior or positive

affirmations (such as head nodding). It was in these classes that the student with CI showed minimal participation.

Although much knowledge has been gained regarding the academic, communicative and social functioning of children with CI in mainstream schools, there is hardly any evidence on the above issues for children with CI attending schools for the deaf. Although the CI technology is similar, systematic studies comparing the profiles of students with CI in mainstream vs. special settings are missing.

Schools for the deaf tend to use sign communication, both with and without oral language, for classroom instruction whereas mainstream school settings tend to utilize oral language (Stinson & Kluwin, 2003). Connor, Hieber, Arts & Zwolan (2000) indicated that regardless of the communication strategy/teaching approach that the schools adopt, namely oral method or total communication, cochlear implantation will have a positive impact on the development of children with deafness provided that the educational programs incorporate training in speech and language skills as well as auditory skills. Indeed, researchers have found that children generally acquire better speech and oral language skills after cochlear implantation when their communication training places an emphasis on oral language – via speech therapy and auditory training – rather than sign language (Cosetti & Waltzman, 2012; Geers *et al*., 2008; Spencer & Marschark, 2003; Tobey *et al*., 2004).

In the technical assistance paper of the Education Department of Florida (TAP, 2004), several guidelines for service provision of implanted students in the various educational settings are proposed. According to TAP (2004), a) the acoustical environment plays an important role for the students' successful use of a cochlear implant and professional staff should contribute to fostering it in the school setting, b) the student's acceptance of the device as well as personal communication goals should be taken into account, c) the combined use of sign and oral language can be used in the educational setting to support the learning process, d) when sign language is used in the school setting, services should be incorporated in the student's educational program that target the use of hearing as well as the development and expansion of oral language and e) staff from the educational setting must work collaboratively with professionals in the cochlear implant center to meet the students' individual educational needs and capitalize on their auditory potential. Most importantly," the communication skills

must be an integral part of the student's educational services and daily living environment" (TAP, 2004, pg. 3).

In all cases, a reasonable expectation is that the everyday communication of deaf students with cochlear implants is likely to be impacted by the type of school setting and the subsequent language of instruction. Moreover, one concern is that students with CI placed originally in schools for the deaf do not transition into mainstream (Thoutenhoofd, 2006). Allen and Anderson (2010) have questioned whether these students with CI can be considered as 'failures' in terms of the success of implantation or whether they are satisfied with their school placement because "effective bilingual approaches for cochlear-implanted students that employ signs in combination with speech" are employed (pg. 346). Indeed, due to the scarcity of studies conducted in schools for the deaf with reference to students with CI, it is difficult to provide answers to such questions. As noted above, there are special goals that need to be set for the development of communication in children with CI as compared to the other deaf or severely hearing-impaired students in the schools for the deaf. These goals relate to their special need to keep oral language evolving. A reasonable question then is: are these goals met in schools for the deaf?

Based on the above, it is important to investigate how teachers of the deaf manage this population of students who are deaf, fitted with an implant and attend classes in the school for the deaf along with other students with hearing impairment or deafness. Do teachers communicate with the students with CI in a different way as compared to the other students? Which communication modality do they use to facilitate language growth in this population and also during instruction? What type of services do schools for the deaf provide for students with CI? Finally, what are the teacher beliefs and attitudes regarding the education and communication of these students and the ways through which service delivery can be improved?

In Greece, according to a survey from the Special Education Office in 1994, students with hearing impairment or deafness were found to be educated mostly in schools for the deaf, namely both residential and special day schools for the deaf and hard-of-hearing (89.9%) and less in inclusive units where students with hearing impairment are attending special units in mainstream schools and are partly integrated with hearing peers in classes or other school activities (10.1%) (Foster, Mudgett-Decaro, Bagga-Gupta, De Leuw, Domfors,

Emerton, & Welch, 2003). Based on the current legislature (Law 3699/2008, article 6, Greek Legislation on Special Education Policies, 2008), students in the inclusive unit may receive specialized group or individual programs. Moreover, students can be fully mainstreamed, with provisional support (namely, a ToD in class with the student with CI) or without it[1].

In 2007-08, the first in-service educational program for students with CI attending schools for the deaf, inclusive units and mainstream schools with provisional support in Greece was implemented by the University of Macedonia, in collaboration with the Unit of Deaf Studies at the University of Patras, funded by the European Union and Greek Ministry of Education (Okalidou, 2010; Okalidou, Lampropoulou, Nikolopoulos, Chute & Nevins, 2010). The program aimed to train teachers of the deaf and other school personnel, in cochlear implant technology, practices and inter-disciplinary collaboration. Teachers of the deaf were trained to implement individual educational programs (IEPs) in audition and oral language for children with CI and in collaborating with inter-disciplinary teams in the school (SLTs, audiologists and CI habilitation teams). Interestingly, the observations made prior to the onset of the training program in CI revealed several pitfalls of the school system in both schools for the deaf and mainstream schools with provisional support, regarding the management of students with CI (Okalidou, 2009). These were:

- A teacher of the Deaf (ToD) taught a class of 3 students with CI using only sign language; no oral language was used in overall communication.
- Speech-language services (SLP) in school were not consistently provided to all students with CI; some students with CI did not receive any speech-language therapy.
- There were inadequate audiological services in schools for students with CI, no liaison with the respective clinics; some equipment failures and false troubleshooting (e.g. scotch-tape on mic!) were noted.
- The same communication mode was used by the ToD during instruction for both students with CI and other deaf students.

[1] In this case, the mainstream teacher can be supported by the regional educational counselors and Centers for Diagnosis, Assessment and Support.

- No modifications were applied to fostering oral language growth in students with CI, such as provision for promoting listening skills in curricula, provision for facilitating oral language skills, etc.
- A hearing-impaired ToD was placed in an inclusive unit of a primary mainstream school, teaching students with CI.
- A teacher with cerebral palsy (CP) having slurred speech and restrained mobility served as a ToD in one-to-one provisional support for a high-achieving student with CI in a mainstream kindergarten.

Upon implementation of the program, the following positive outcomes were noted: a) improvement in listening skills by students with CI, b) gains in teacher knowledge of cochlear implantation and troubleshooting, c) educational practices related to monitoring progress of students with CI and implementing IEPs, d) adaptations of the curricula, and e) creating provision policies in schools for the deaf regarding students with CI. The latter included providing SLP services to all the students with CI, mandatory placement of hearing teachers in classes that contained students with CI or pairing a hearing ToD and a Deaf ToD in co-teaching models (Okalidou, 2010; Okalidou, Anagnostou, Kitsona, Tsoukala, Gouda, Santzakli, Katsifa & Nikolopoulos, 2011). However, several years have passed and the teaching staff has changed. Based on the above, the scope of this study was twofold: a) to examine the current practices that schools for the deaf – formerly trained in cochlear implantation – adopt in managing communication of students with CI b) to evaluate whether long-term change has occurred in these schools for the deaf and whether it has been integrated into the management of communication of students with CI. Hence, a qualitative study was conducted through semi-structured interviews of school personnel to sample the main ideas, practices and concerns. Studying the differences before and after the in-service program is considered of major importance for future educational policies and research in the area of special education.

The research questions that were addressed were: a) how is communication of students with CI managed in schools for the deaf? b) What is the current state, needs and challenges for educating students with CI in schools for the deaf?

Method

Interested in recording personal experiences, concerns, and perceptions of the current situation in the participating schools for the deaf, the researchers decided to use a qualitative approach. Of utmost importance is not the generalizability of results as in quantitative studies but an in-depth description and dissemination of the perceived experiences (Lincoln & Cuba, 2011). As claimed by Auerbach and Silverstein (2003), the validity and reliability of qualitative studies are reinforced by "transparency in analysis, communicability of theoretical constructs, and internal coherence" (p. 78).

Participants

The six interviewees, five women and one man, were employed at three different primary schools for the deaf in two major Greek cities; they all had teaching experience of at least 10 years in special education. The sample comprised of one speech language pathologist (coded as S3), two teachers of the deaf (coded as S1 and S2) and three director managers (coded as D1, D2, and D3) who had had several years of teaching experience in special education before moving to managerial positions. The schools were coded as One (1), Two (2), and Three (3). Traditionally, schools 1 and 3 have been following the bilingual-bicultural educational method (BBE) and school 2 has been following the oral communication method. As they are all special primary schools, the age of the attending students has a range of 6 to 14 years. During the research procedure all ethics requirements were met (Cohen, Manion, & Morrison, 2008).

In the first school, 22 of the 59 attending children had been implanted. Among them, seven students with CI also had additional disabilities. In the second school, 12 out of 22 attending children had a cochlear implant, six of which had additional disabilities as well. In the third school, 14 out of 32 children had been cochlear-implanted; two of these had additional disabilities. The age of implantation varied significantly from 3 to 11 years; children being in higher classes nowadays had been implanted at a later age than the younger ones. Some children had been implanted even before attending primary school, and as early as 2 years of age; other children were implanted after their primary school enrollment, namely at 6 years of age, and some at even older ages, such as 11. No child has been implanted as early as in the first year of life, an age at which children are commonly fitted nowadays. In some cases the children had to undergo a second operation since the first one had failed. Moreover, in the cases with additional disabilities, the situation was characterized as more severe.

Research Tools and Procedures

The qualitative material was gathered in focused semi-structured interviews based on the interview guide list which included the research questions plus 3-4 prompt questions in order to elicit more information when necessary. The focused semi-structured interview allows the researcher to give more space to the interviewees as they can comment on various issues without having to respond to a specific order of questions. The interviewer uses a roughly sketched pilot guide which sets up a broader context within which the interviews are conducted, directed, and focused (Bell, 2007; Millward, 2004). Analyzing data is more complicated than in a highly structured data-collecting form, however, this type of interview was chosen because it better suited the scope and purpose of the current research. All interviews were conducted by one of the researchers (author 4), face-to-face in the cases of the two schools using the BBE method and via Skype in the case of the school using the oral communication method. All interviews were audio-recorded by the interviewer (author 4). One of the other three researchers (author 1) transcribed the recorded interviews; thereafter, the researcher who had conducted the interviews (author 4) verified the accuracy by listening to and checking the transcript. All inconsistencies found were of minor importance and thus, ignored.

Data Analysis Method

Data coding followed Auerbach and Silverstein's method (2003), the basic idea of which is "moving from raw text to research concerns in small steps, each step building on the previous one" (p. 35). Their method is based on Grounded Theory where the qualitative researcher both systematically and carefully follows coding processes, repeatedly comparing the expressed ideas of the participants to the initial research concerns, a process that leads to the formulation of theoretical constructs and to the final interpretation of the findings (Charmaz, 1995; 2006; Strauss & Corbin, 1998). According to this theory the steps followed in the coding process are: *Raw Text, Relevant Text, Repeating Ideas, Themes, Theoretical Constructs, Theoretical Narrative, and Research Concerns*. For example, the following *Repeating Ideas* 'depending on skills', 'grouping selectively', 'meeting the needs', 'the age of the students is not a barrier', 'educational level is the key' were organized under the *Theme* 'Flexibility in class organization'. Two of the researchers (authors 2 and 3) initially coded the emerging *Themes* independently and then compared their coding, reaching a high agreement

level of 86%. In the cases of disagreement they reread the interview excerpt and discussed the correct coding and suitable categorization until consensus was established. For the purposes of this article all unrelated codes were discarded and for each *Theme* two or three quotes were selected and translated into English by consensus of all researchers.

By following this method, 165 *Simple Ideas* were identified in the *Raw Text* material which were organized into 68 *Repeating Ideas*; thereafter these were categorized under 16 different *Themes*. The latter were grouped into five (5) main *Axes and Categories* (*Theoretical Constructs*):

1. Communication channels of students with CI
2. Training and instructional approaches for students with CI
3. Organizational management and an interdisciplinary approach for students with CI
4. Emerging needs and challenges in training, resources, and collaboration
5. Assessment of the current situation and proposals

These *Axes* corresponded directly to the two Research Questions (*Research Concerns*). In Figures 1, 2, 3, and 4 one can observe a Tree Diagram representing the last two levels of abstraction and how closely related concepts in lower levels (*Themes*) were grouped into a larger more inclusive concept (*Axes*), which corresponded ultimately to the Research Questions.

Results

Axis 1: *Communication channels of students with CI*

In two of the schools for the deaf participating in the research, simultaneous communication (SimCom), i.e. both oral language and a manual variant of that language containing signs and finger spelling, is being used in communication and training. Schools for the deaf ‘always support the use of oral language’ (D1). Parallel to sign language ‘we use the oral language extensively but we cannot overlook the fact that they remain hearing-impaired’ (D3).

These schools acknowledge a gradual shift from sign language to oral language. Depending on the efficiency and development of the cochlear implant, as well as on their gradually successful adaptation to it, students with CI shift from using the manual

communication mode to using the oral communication mode more extensively; then 'their basic communication tool becomes oral language' (D1). Whenever they are obliged to remove the external part of the implant 'they seem indifferent, out of place; they immediately turn to sign language or lip reading and demand to be addressed in sign language also' (D3). However, there are 'some children who can take full advantage of the implant and they indeed communicate orally while others cannot understand how the implant works, and cannot take full advantage of its possibilities; in such cases we turn to sign language' (S3). Nevertheless, sign language remains fundamental even for children with CI. Teacher of the Deaf S1 noted 'especially in higher, more abstract language levels where the demand for abstract notion is present, acquisition and understanding are essential and sign language remains the fundamental communication mode'.

In addition, a substantial amount of code switching was mentioned. Students with CI 'are aware of who can hear and who cannot and choose modes accordingly' (D1). As participants from these two schools noted, students with CI use both communication channels. When addressing people who are able to hear or when they communicate among them, students with CI use the oral communication mode; when addressing the hearing impaired, they use the manual communication mode. Whether the addressee is a teacher or a classmate makes no difference to the mode chosen. Moreover, 'some students with CI function as interpreters between hearing people who cannot use sign language and hearing-impaired people who exclusively use sign language' (D1). Some participants also observed that when students with CI enter a different environment – outside the school for the deaf i.e. go to mainstream schools nearby – they tend to use sign language when addressing their group. Interviewees tried to explain this tendency as follows: students with CI are either searching for identity or simply feel they belong to a certain community. Nevertheless, when they pay a visit to their old schools they tend to use oral language when addressing their old teachers. Director Manager D3 commented: 'I have noticed this attitude of theirs probably because I had always insisted on using oral language with them. I have always urged them to keep trying, to keep oral language growing – especially when they moved to mainstream education. Sign language seems easier and handier to them; but they should capitalize on their progress in oral language'.

However, one school for the deaf that participated in the research adopts the oral communication method, with occasional use of some signs, when and if necessary. Most of the students communicate among themselves and with their teachers using oral language. Only when they find it difficult to explain some concepts do they tend to use signs or other explanatory gestures – but they do not use sign language in full. 'For children who have not yet developed oral language, we use signs (loans) in order to overcome difficulties during instruction and communication' (S2). In this school, practices related to classroom acoustics are rigorously applied. 'In our school, classroom acoustics play an important role because we take into account that communication and teaching use the aural channel. This [benefit of classroom acoustics] cannot be obtained at mainstream schools' (D2).

[insert Fig. 1 here, Research Question 1, axis 1]

Axis 2: *Training and instructional approaches for students with CI*

In all three schools for the deaf participating in the current study, class grouping is based on the skills and needs of the children – not on their age. Regardless of whether the oral communication or the simultaneous communication method is used, there is high flexibility in organizing 'classes with varying numbers of children, of different ages but similar potential' (D1). Official state curricula are flexibly modified or tailored according to learning potential: 'if more time is needed to complete a certain knowledge level, schools for the deaf are able to provide it' (D1), 'for three years I was teaching the same class of 6 children, four of which had been implanted; their progress was amazing' (D3). Teachers 'can choose what to teach are free to make selections and can work independently of the children's various ages' (D1). All participants agreed upon the following: 'in schools for the deaf, teachers have the possibility to modify the curriculum and the teaching content; unlike what happens in mainstream schools where curriculum and content cannot easily be either modified or reduced' (S2).

For instructional purposes teachers take full advantage of classroom acoustics, modern technological devices and school infrastructure: 'the specially designed environment in our classrooms supports language understanding' (D1). All three schools for the deaf are equipped with suitable technological devices: 'the high quality technology used in our school permits the use of specific sounds; I teach such a large part of the curriculum by playing

games, watching movies, using the interactive board and the web, that I sometimes forget that the children are almost deaf' (D3). Nevertheless, success also depends on the proper functioning of the implant, on additional disabilities if any, and on specific needs that a particular child has. One participant described one such case as follows: 'at first when he came to our school we thought he was retarded; this is how desperately poor his vocabulary was after four years in mainstream education; but his only problem was that he didn't know how to take advantage of the implant' (S1).

Teaching methods and learning objectives are designed at the beginning of the school year to meet the special needs of the children but formatively adapt to their progress even within the same school year: 'our students are initially distributed into certain classes in September but within the year there is high flexibility and possible mobility if the benefit for a particular child is going to be higher in another class with classmates of different potential' (D3). As soon as the educators realize that a child can actually hear them, they 'change the approach method in class' (D3). They are also prompt in interchanging approach methods whenever a sudden problem occurs: 'a child told me once: if you please, Miss, use the sign language from now on because the battery of my implant is unexpectedly dead' (S1).

In the two schools which in the past used the bilingual-bicultural educational method, but now use the simultaneous communication method, aural training is selectively used and gains ground in everyday instruction. There is high flexibility in interchanging instructional methods into more or less aural: 'it is the children who lead the way; depending on the children's potential and the function of the implant, I flexibly interchange the instructional methods I use in class into more or less aural exercises' (D1), 'aural instruction helps students with CI disengage from sign language, visual contact and reading lips' (D3), 'you suddenly realize that the child has come to an understanding, can hear you from a certain distance, can tell the various words apart, has learned and can remember the words from the previous lesson' (S1). However, in higher-order, advanced language and knowledge levels, sign language is exclusively used even with students with CI: 'understanding plays the most important role at a more abstract level; where abstract notions are concerned sign language is exclusively used as it is the most helpful teaching method in such cases' (S1).

On the other hand, in the oral school, aural training is widely applied for all instructional purposes: 'teachers use just a limited number of signs only when a child finds it

extremely difficult to understand during class; even then, they use only some loans of sign language, not sign language itself' (S2). The knowledge level and potential of students with CI also determine the setting of learning objectives. Also, the design and adaptation of teaching procedures is commensurate to 'the learning capabilities of the children; after some years in our school their progress is so noteworthy that they participate in joined and inclusive educational programs with the mainstream school nearby' (D2).

[insert Fig. 2 here, Research Question 1, axis 2]

Axis 3: *Organizational management and interdisciplinary approach for students with CI*

All schools for the deaf participating in the research have human resources of a high calibre and use an interdisciplinary approach towards students with CI. Furthermore, the role of SLP is highly acknowledged, yielding a variety of services, depending on the school's educational scope.

All personnel employed in schools for the deaf are suitably qualified and educated in hearing impairment. Not only teachers but also 'social workers, psychologists, SLPs, special educator assistants' (D2) work there and cooperate on a daily basis. However, there are some differences: First, the oral school follows a stronger interdisciplinary approach than the schools which had originally been following the bilingual-bicultural educational method and are currently using the simultaneous communication method, both manually-based communication approaches. Besides the IEPs for students with CI, the oral school follows a formative evaluation schedule throughout the year. As Director Manager D2 described 'an interdisciplinary team comprising of all related specialties assembles every fortnight, assessing the whole profile of every CI child: personality traits, family environment, level of hearing difficulties, personal capabilities, knowledge skills, adaptability, oral language capabilities, social adaptability and development, speech production skills, and so forth. All major decisive factors are taken into account when designing an IEP for that student'. Second, in the schools for the deaf that adopt a manually-based communication approach, the teaching personnel include both hearing and non-hearing teachers 'who teach simultaneously in many classes' (D1), 'in our school five Deaf teachers are employed together with their hearing colleagues; we believe that it is of major importance that one of them has now obtained a permanent position in our school' (D3).

Nowadays, the work of SLP professionals with students with CI is considered another important factor in their development and it is a highly acknowledged service within the schools for the deaf, regardless of the educational method: 'treatment [SLP] at least once per week for every child; it depends on their number of course. We are in need of a second SLP because one colleague is not enough to treat every child' (D1). Nevertheless, the two schools following manually-based communication methods try to offer SLP treatment exclusively inside the school based on personnel capacity and the school's infrastructure. As their representatives believe, the SLP needs of students with CI are sufficiently met: 'in our school there are two SLPs which treat the children in one or two sessions per week, sometimes more; and that makes all the difference' (S3). The staff not only covers the needs 'in our school but is also assigned some duties at the nearby kindergarten where there are no specialized personnel yet' (D3). Meanwhile in the oral school, the role of SLPs is much more intervening and upgraded: SLP professionals not only support language treatment of students with CI who 'are treated at least once or even twice a week' (S2) but are also 'involved in handling the teaching content, for example assisting with vocabulary understanding in the History lesson' (D2).

[insert Fig. 3 here, Research Question 1, axis 3]

Axis 4: *Emerging needs and challenges in training, resources, and collaboration*

In the interviews, a number of emerging needs and challenges were identified and an urgent necessity to cover the shortages was widely expressed. These shortages refer to: a) continuous educational training programs for both teachers and professionals working in schools for the deaf, b) specialized training on technical matters, concerning the cochlear implants, and c) cooperation challenges in and out of school.

All participants stressed the need for continuous professional training concerning the specific elements in using cochlear implants: 'it is absolutely necessary to obtain training in CI, especially for a teacher newly assigned at a special school without former knowledge on the subject' (S2), 'our training is essential; our knowledge is scarce' (D3), 'the main informer about the use of the implant is the child's parent' (S2). On the side of the State there are no such training programs at all; whatever exists is in the form of short-term seminars or self-training attended by the teachers depending on personal interest, individual decision and

willingness to participate: ‘we pay for our own training, sometimes follow CI seminars but still feel a lack of specialized knowledge’ (D2), ‘the last time we happened to be trained in high quality CI seminars was in 2008; since then, there has been no official program at all’ (D3), ‘I attended one-day seminars, relative conferences, I obtained knowledge at my own expense both in time and money’ (S2), ‘I attended many seminars in my personal training career; the newly assigned teachers are in urgent need’ (S3), ‘in our school we organize one-day awareness conferences every year but there is a clear lack of interest on the part of the State’ (D2).

The function of cochlear implants is not at all simple and facing technical problems or damage leads teachers to experience stress or anxiety: ‘all implants are not the same; how does it work, which brand is it, how can one put it on, what are its elements, its abilities?’ (S2), ‘I know it doesn’t function well but I cannot know exactly where the damage lies’ (S3). Training teachers about the special elements of the implants and how to use them should be a responsibility of the retail companies as some participants commented: ‘on behalf of the State there is no such possibility; teachers should be taught how it works, what the latest software is all about’ (D1), ‘it would be most useful if the firm sent a technician to our aid; if part of the device gets lost in the classroom, it is followed by panic either because of the possible damage or of the huge cost involved’ (D3), ‘in case of damage, we have to call technical support; this is not always easy or convenient’ (D2), ‘what we are in urgent need of is some kind of handy technical support on a regular basis’ (D1).

The need for substantial cooperation at various levels was also noted by the participants in the research. First of all, the collaboration with the children’s families was characterized as necessary, extremely useful, and constructive: ‘we cope with students with CI and their families altogether’ (D1), ‘the family plays an absolutely important role in this matter’ (S1), ‘our goal is to stand by the child with special needs by all means and in all aspects of their life’ (D3). Thereafter, cooperation with other schools, professionals outside the schools for the deaf, the medical community and treatment centers, as well as official state organizations was mentioned.

However, schools for the deaf differed in degree of extroversion and type of collaboration they aim for with external parties. The two schools following manually-based educational methods and currently using simultaneous communication reportedly prefer to be

more self-confined while the oral school adopts a more extroverted perspective. In the first case, the school is considered the center of all activities where all other structures need to be attached: ‘our school is open to society, we cooperate in harmony with therapy centers, law enforcement organizations, state organizations for the impaired, the city authorities and people who are willing to support our work. But our children do not receive speech-language treatment outside the school; they are satisfied with what our school offers’ (S1), ‘it is worth noting that no external pathologist ever came in touch with me; they cannot accept the fact that I am a state employee while they work in the private sector’ (S3). In the second case, the oral school reaches out regularly to professionals that treat the students with CI outside the school and also fosters tighter collaborations with the local mainstream school and the local CI centers. As interviewees noted, ‘twice a year we meet with the speech-language therapists who treat the students with CI at home, conduct discussions, make decisions, and common plans so as to achieve better results’ (D2), ‘we have managed to carry out many joined environmental, cultural, health care programs in cooperation with the mainstream school nearby; both children and parents are thrilled to participate. Parents in awareness and also diagnostic groups at local hospitals back up our work’ (D2). Moreover, in case of mainstreaming they ‘keep a constant collaboration with the SLP therapists of these children, setting the same goals and aiming for the same objectives’ (S2).

As far as the issue of collaboration on behalf of the child’s interest is concerned many challenges or even dilemmas were identified: ‘if the child’s family cannot handle the issue, there is such extreme psychological pressure that we cannot function as effectively as we had hoped for’ (D1), ‘her mother never accepted the use of sign language; she even forced her to abandon it – that made her regress in the progress she had achieved till then’ (S1), ‘coming in contact with other professionals who have taken care of the child in previous stages is not always possible’ (S2), ‘there are children who were operated on without their families being properly informed about the possible advantages or disadvantages; it is us, the teachers, who have to make things work’ (D1), ‘sometimes there are poorly updated children’s files which complicates things and provokes extreme delays’ (S2). The participants also criticized the involvement of people outside the schools for the deaf which often complicates the situation. Most of the criticism was targeted towards the medical community: ‘Is the doctor the most suitably qualified person to judge which kind of education children with cochlear implants should follow? I get so frustrated when doctors insist that they [the children with CI] should

begin at a mainstream school; if a child is not allowed to gain the most out of the implant what's the point of undergoing such surgery?' (S1).

Axis 5: *Assessment of the current situation and proposals*

The participants admitted that they feel privileged to have attended the 2007-08 in-service educational program for students with CI. As one described it 'I was lucky to attend that seminar. I gained so much knowledge about the possibilities offered by the implants. I now feel better organized; I learned how to keep a protocol of the work done; I still use the obtained knowledge in every class I teach' (S1). Nowadays, in the schools the situation has indeed changed. Deaf and non-deaf teachers collaborate more extensively as 'co-teaching is now common practice' (D1). Teaching practices such as aural training seemed at the time of the 2007-08 in-service educational program for students with CI, pioneering or unprecedented, but today they are commonplace: 'in our school there are now classes comprising exclusively of children who are able to hear. Their knowledge level increases, as time passes; aural teaching practice is most helpful' (D1).

Mainstreaming of students with CI was also commented upon in a critical way. Most of the interviewees believe that special schools are the only ones suitably equipped and have all the means necessary to help students with CI succeed in their educational struggle: 'the usual prejudice is that a certain device is implanted into the child's head and then he/she can suddenly understand everything' (S2). In mainstream education, many problems could occur: 'too many children in the class, large curriculum, learning milestones to reach; infrastructure for sound insulation and absorption in classrooms are usually considered a superfluous luxury' (D2). The interviewees suggested that it would be much better for a child with a CI to attend a special school first and then, if possible, transfer to mainstream education. As participant D1 explained: 'we definitely propose mainstreaming only when we are absolutely certain this is possible. Already facing the disadvantage of a hearing disability, how could a child hold on when forced to face fundamental knowledge shortage as well?' (D1).

Participants in the research stressed their desire for more collaboration with external parties and further interdisciplinary approaches in favor of students with CI. 'We are open to proposals, suggestions, cooperation; we believe that any problem can be solved through working together with willing experts outside our school such as university experts' (S2), 'we

are willing and able to organize and create classes exclusively for students with CI if their numbers permit; and work with them separately' (S3).

[insert Fig. 4 here, Research Question 2, axes 4 and 5]

Discussion

Although abundant information exists regarding the mainstreaming of students with CI, there is a scarcity of studies for those students with CI who attend schools for the deaf. Thus, the current paper focused on obtaining an updated view of the communication management of children with CI in schools for the deaf in Greece, following the first in-service educational program for students with CI that took place in these schools in 2007-08. Focused semi-structured interviews of representative, experienced members of the school personnel were conducted in order to tap into the current professional practices adopted by the schools and record communication behaviors among students with CI, ToDs and other deaf students, during instruction and social engagements. A final goal was to unfold the staff's professional views in relation to current state practices, needs, concerns and challenges.

A preliminary conclusion is that the profiles of students with CI who attend schools for the deaf do not differ dramatically from the general profiles of children with cochlear implants. Based on the demographic data gathered in this study, nearly half of the student body (42%) in the three schools for the deaf in the two major cities of Greece consists of children with cochlear implants and more than two thirds of these students do not have additional handicaps. This finding is surprising given anecdotal evidence that only a small percentage of students with CI attend schools for the deaf, and of those, a large proportion are students with additional handicaps. The percentage of students with CI and additional handicaps in these schools seems to match the one observed in the general population of hearing-impaired, namely around 30% (Gallaudet Research Institute, 2008). Furthermore, the wide range of age of implantation observed in the students with CI attending these schools for the deaf does not differ substantially from the population of students with CI in mainstream. Indicatively, a wide variation of age of implantation was also observed in the Percy-Smith *et al.* (2008) study in Denmark, where 164 children with CI attending mainstream had been implanted from age 6 months to 17 years. Yet, the current sample is a little different from the one described in the literature regarding a) the rare occurrence of early implantation, that is

under three years of age and b) the reported re-implantation in a few cases. Moreover, the teachers reported that some students were not originally using their implant with success, a finding not reported in studies in mainstream. Unfortunately, no information on parental background and preference of oral vs. sign language in home communication was gathered. One account for the large proportion of students with CI in special settings in Greece can be attributed to the country's long tradition for separate schools for the deaf and also to a lack of support for inclusion among involved parties, such as ToDs, parents, governmental agencies and the deaf community (Foster *et al*., 2003). Also, the lack of specialized personnel and support services for students with disabilities in the recent past may have constrained the integration of deaf students in mainstream schools (Lampropoulou & Padeliadu, 1997). Such difficulty in obtaining special services in mainstream schools (Sorkin & Zwolan, 2004) has also been acknowledged by a national parent survey in the U.S. where one third of students with CI could not obtain special services. Apparently, a more systematic investigation of the number of students with CI that attend inclusive vs. special education in Greece is needed – along with information on background history and academic achievements – before reaching a conclusion in this respect.

The findings pertaining to each question are summarized and discussed below.

Research Question 1: How is communication of students with CI managed in schools for the deaf?

Although the majority of children with CI who attend mainstream schools use oral language for their communication in school, different trends were noted in schools for the deaf. Use of oral language has definitely become part of communication and instruction for students with CI in these schools for the deaf and a recent change in the communication method used nowadays, i.e. from BBE to simultaneous communication, has been noted. Reportedly, all three schools for the deaf used some combination of sign and oral language as well as applied specialized training in audition to foster development of oral language in implanted children. In general, staff was aware of the special needs of students with CI regarding oral language as contrasted with the rest of the deaf students in their class.

However, differences were noted in communication management of students with CI. These related to the school's philosophy, organizational culture and orientation to issues of communication. One school used the oral communication method as the primary choice, providing instruction and fostering communication via oral language. Signs were used only selectively, as loans from another language, without a systematic use of Greek Sign Language (GSL) per se. The other two schools diverted from their traditionally used bilingual-bicultural educational approach in order to accommodate the students with CI. They used simultaneous communication or, interchangeably, sign language with oral language during instruction and social engagement to transfer language content effectively. Such code switching between the two communication modalities was freely applied during teacher-student interactions and also during the communication of students with CI with the outside world. Interestingly, the students with CI from these schools used a suitable modality each time for addressing persons with normal hearing versus hearing impairment respectively. However, as one of the school directors, D3, commented, additional effort was made for the students with CI to use oral language within the schools with manually-based approaches; apparently, this is due to the fact that sign language is the predominant modality in these school environments.

In this study, ToDs and SLPs reported that the students with CI are very well integrated and the use of GSL granted them a sense of belonging to their own special community. Apparently, they do not seem to face communication problems in the school. This contrasts with the findings from mainstream schools where students with CI, despite their generally good psycho-social adjustment (Nicholas & Geers, 2003), were not socially integrated to the same extent as their hearing peers, sometimes facing communication challenges via oral language (Bat-Chava, Martin, & Imperatore, 2014; Damen, Langereis, Snik, Chute, & Mylanus, 2007; Mukari, Ling & Ghani, 2007; Rich *et al*., 2013; Wu, Liu, Liao, Chen, Chang & Lin, 2013). Previous studies indicated that other factors also play a role in the latter outcome, such as the ability of school personnel in the mainstream schools to adapt to the special needs of the students with CI, and the lack of support services, etc (Jachova & Kovacevic, 2010).

Research Question 2: What is the current state, needs and challenges for educating students with CI in schools for the deaf?

Several aspects introduced after the implementation of the 2007-08 in-service educational program for students with CI appear to form the current infrastructure observed in this study and several past practices have been remediated. Current practices are: a) aural training is an integral part of the educational practice, b) IEPs for audition and language are constructively used by ToDs, either formally or informally c) there is awareness of the importance of CI technology and troubleshooting d) an interdisciplinary approach towards students with CI is strongly implemented and the role of SLP is highly appraised e) the co-teaching model of a hearing and Deaf ToD originally implemented in one BBE school during the 2007-08 in-service educational program for students with CI is nowadays integrated in these schools' organizational culture[2] f) collaborations with parents of children with CI are underway.

The study revealed certain differences in the educational management of students with CI in the schools for the deaf of this sample as compared to the mainstream. First, the students were grouped in grade levels based on skills and needs rather than chronological age alone. Second, ToDs and other school personnel were familiar with CI technology and troubleshooting of the device and used modern teaching techniques such as interactive technology for instruction. Third, the communication modality shifted to simultaneous communication or from oral to sign language and vice versa, leading to a complementary use of the two language systems (code switching). The adoption of the particular communication pattern depended on topic difficulty (such as teaching more abstract concepts), as well as the student's profile and their own communication preference. Fourth, there was flexibility in setting learning objectives, which implies that pacing during instruction and breadth of material covered depended highly on performance of students with hearing impairment in class, including the students with CI. Flexibility was also reported by ToDs in choosing special designs and adaptations during instruction for students with CI. The above management options are not reported in mainstream schools.

With respect to the reported needs and challenges, all of the participating school professionals in this study a) stressed a need for further training in the highly specialized and

[2] It should be noted that this model was introduced by one of the BBE schools as part of their innovative practices for students with CI enrolled in special classes for the deaf and was assessed as a best practice by the 2007-08 in-service educational program for students with CI.

dynamic field of CI, with provision of more in-service programs by the State, following the 2007-08 in-service educational program for students with CI and b) advocated that their school establish tighter collaborations with medical staff, audiologists and technical experts, expressing strong concerns regarding the troubleshooting of CIs. Moreover, a need for cooperation with the children's families, professionals outside the schools for the deaf, the medical community and treatment centers and official state organizations was expressed.

Finally, it was apparent that the schools for the deaf in this sample differed in orientation, philosophy and organizational culture. The school which used the oral communication method, apart from following a different communication policy, conducted more integration programs with the local mainstream schools and applied a more formalized implementation of IEPs biannually. Furthermore, it was more extroverted in working together with professionals outside the school and had strong ties with local CI centers and ENTs. Even though they applied considerable and suitable modifications to their core program to fit the needs of students with CI, the schools that originated from the bilingual-bicultural educational method and were currently using the simultaneous communication method, tended to be self-confined. This trend supported a holistic organizational culture, which relies on delivering all services inside the school rather than forming extensive functional collaborations with other professionals outside the school. Moreover, the school personnel expressed feelings of mistrust for the doctors and other parties, such as governmental agencies, who might be intrusively intervening in the functioning of their school.

It should be noted that the schools for the deaf in this sample although they are considered prototypical and were drawn from the two major cities of Greece do not necessarily represent the organization and practices adopted by other schools for the deaf throughout the country for students with CI. Therefore, the above conclusions cannot be readily generalized to other schools for the deaf which have not received formal in-service training programs for students with CI in Greece.

Interestingly,, the current findings compose a model of organizational functioning (Fig. 5) in these schools for the deaf in Greece for students with CI. The model lays out the foundation of their professional practice which has evidently developed over the past eight years and is different from the one adopted internationally in the mainstream. It initially involves the special grouping of students, even in a class designed for students with CI only,

and then, assessment of the contribution of the student's assistive technology to the student's performance. Subsequently, communication adaptations through aural and/or visual channels (code switching) are made in an effort to fit the students' skills and needs for communication. Finally, flexibility is applied in setting learning objectives as well as in designing and adapting teaching procedures and curricula. Future studies should further explore whether the same principles of organizational functioning guide other schools for the deaf in Greece and abroad.

[**insert Figure 5 here**]

In conclusion, the schools for the deaf in Greece in this study, appear to have capitalized on knowledge gained via in-service programs in cochlear implantation. They have further managed to develop expertise in this field and special services, including the speech-language service for students with CI; the latter is a specialized area for speech-language therapists in Greece (Okalidou, Kitsona, Anagnostou, Tsoukala, Santzakli, Gouda & Nikolopoulos, 2014). Evidently, similar practices to the ones established in inclusive units and settings internationally, namely, delivery of special services for students with CI, such as IEPs and speech-language therapy are adopted. However, these schools for the deaf in Greece appear to capitalize more on flexibility and variation of communication mode, as well as instruction and curriculum for students with CI. These may lead to different levels of learning outcomes for students with CI in mainstream versus special education. This aspect needs to be carefully assessed in future studies. Interestingly enough, the school professionals in these schools for the deaf expressed criticism for mainstreaming students with CI, a viewpoint which other professionals strongly oppose.

Generally, the type of communication modality used in classrooms plays an influential role on the overall language development of children with CI. Yet, conflicting outcomes are reported. Most studies reported advantages of the oral communication mode in the classroom for the development of spoken language skills (Archbold, Nikolopoulos, Tait, O'Donoghue, Lutman & Gregory, 2000; Cullington, Hodges, Butts, Dolan-Ash & Balkany, 2000; Geers, Nicholas & Sedey, 2003; Kirk, Miyamoto, Lento, Ying, O'Neill, & Fears, 2002; Peterson, Pisoni, & Miyamoto, 2010; Tobey, Rekart, Buckley & Geers, 2004). In contrast, a few studies reported advantages in some areas of language development for children with CI who use both sign and oral language (Connor, Hieber, Arts & Zwolan, 2000; Jiménez, Pino &

Herruzo, 2009; Tomasuolo, Fellini, Di Renzo & Volterra, 2010). Finally, some studies reported no difference in language development as a function of type of communication method employed (Niparko *et al.*, 2010).

On a national perspective, inclusive services are not as well developed in the mainstream for students with CI in Greece as compared to other countries such as the UK or USA. Thus, speech-language services, IEP goals and hearing services are not currently established in mainstream schools for students with CI. It is likely, that part of the criticism of ToDs may reflect only the pitfalls of the national system rather than the mainstreaming practices world-wide. In all cases, future work is needed in order to compare the currently reported practice with the international practices of schools for the deaf as well.

The scope of the present paper was not to draw conclusions on comparisons between the special and mainstream education systems for students with CI. Obviously, a different type of study is needed to fulfill that goal, including further examination of student profiles and academic achievement among other variables. In a world where language is communicated via sounds, these students need to be supported in both mainstream and special school settings by having professionals and peers respond to their auditory needs and modify their communication styles while addressing oral language to them. Furthermore, apart from accommodating students' needs, teachers need to become familiar with, and be regularly updated regarding cochlear implant technology and individual children's profiles in order to adjust their educational practices. Evidently, a need for provision of in-service programs on a regular basis in schools became apparent in this study.

The crux of the matter is that a broadly acclaimed goal of these students is to reach an optimal level of functioning with their CI and achieve academic and social success along with social integration into the hearing world. This end goal needs to guide the choices of both types of educational settings. It is suggested that both models will be further explored to elucidate ways that students with CI can benefit by achieving their educational and life goals. These data will hopefully add value to the consolidation of different outcomes at a national and international level.

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Figure 1: Tree diagram of the Communication channels of students with CI in schools for the deaf.

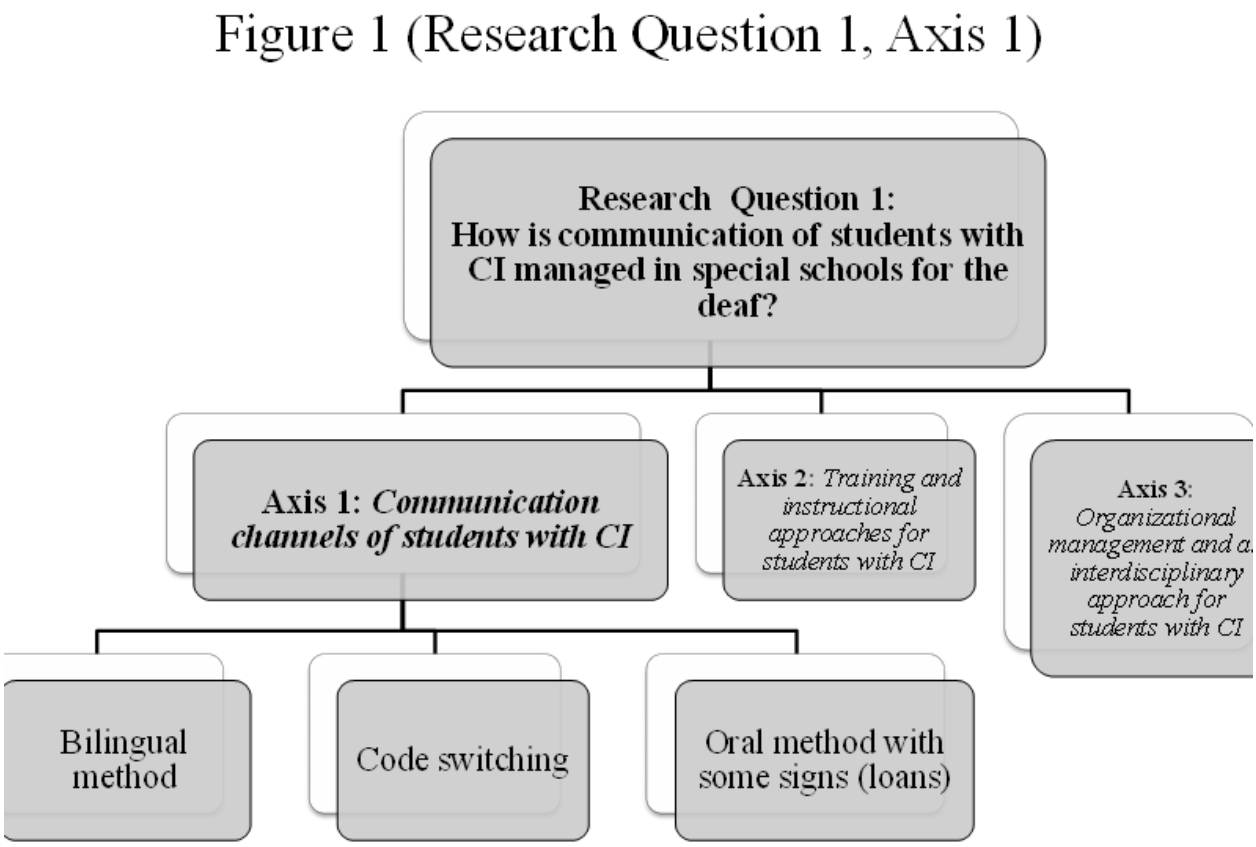

Figure 2: Tree diagram of the Training and Instructional approaches for students with CI in schools for the deaf.

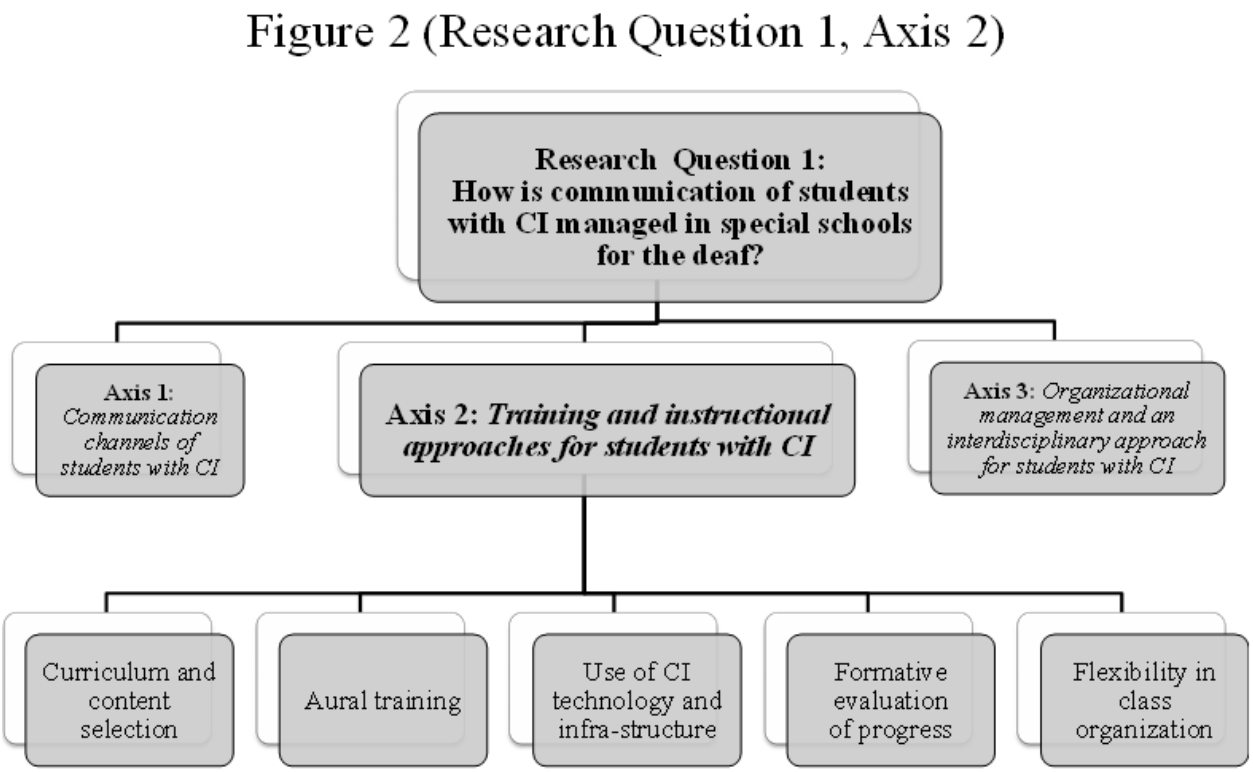

Figure 3: Tree diagram of the Organizational management and an Interdisciplinary approach for students with CI in schools for the deaf.

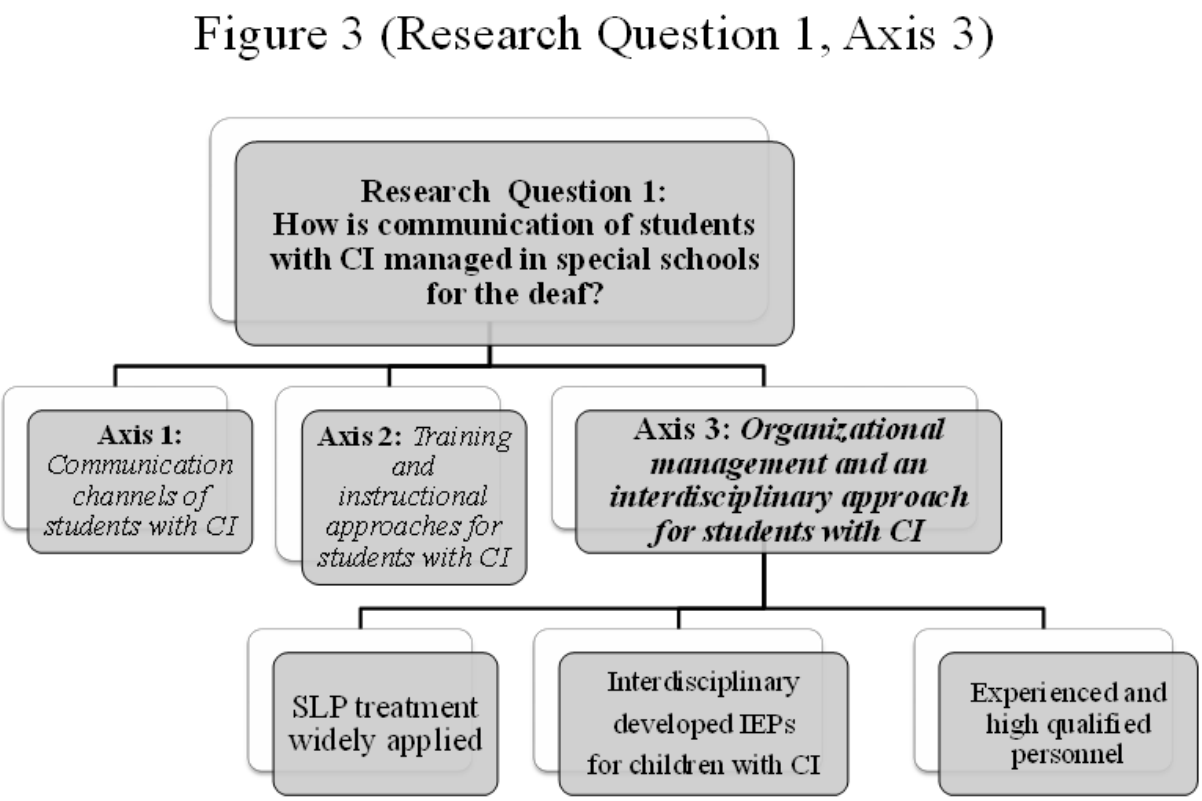

Figure 4: Tree diagram of the current state, needs and challenges for educating students with CI in schools for the deaf.

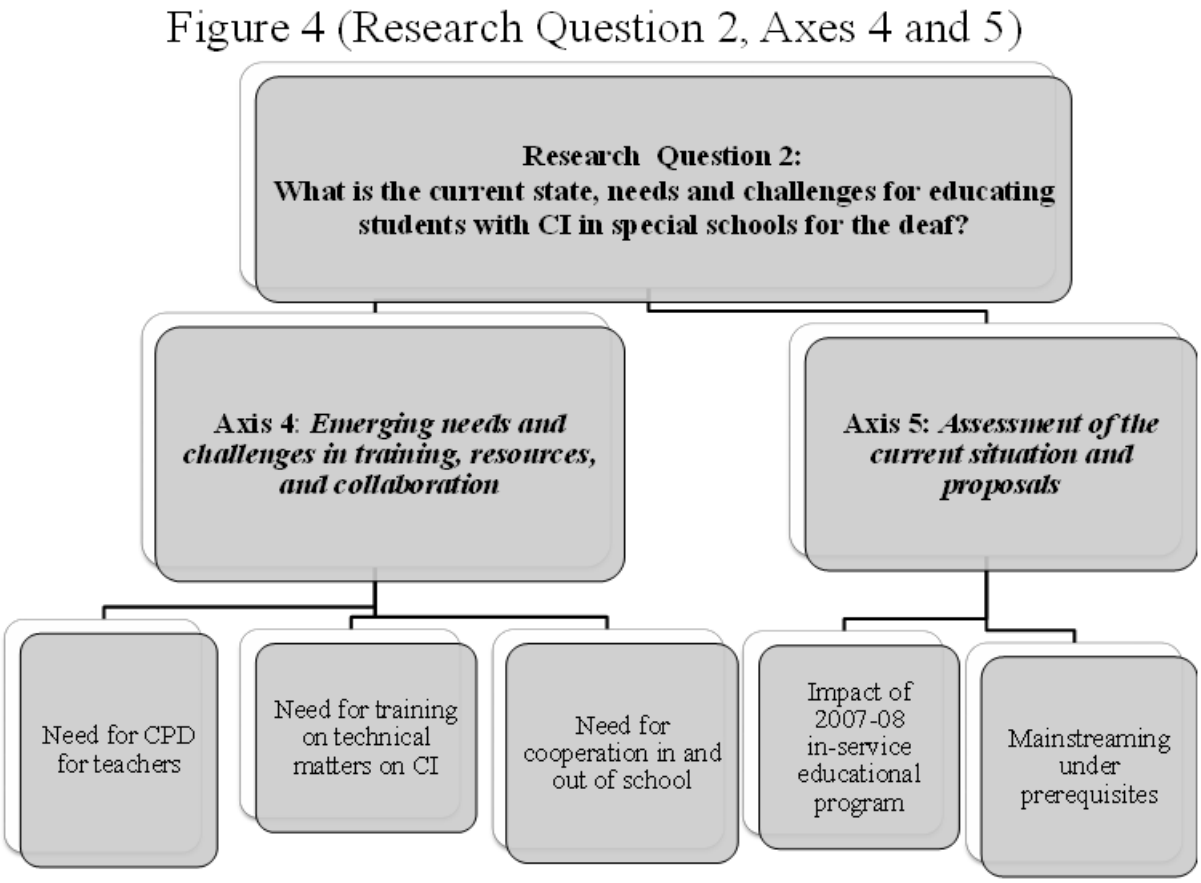

Figure 5. Illustration of an organizational model implemented in schools for the deaf in Greece for students with CI.