Study of the educational situation of hearing-impaired students

FIAPAS
CONFEDERACIÓN ESPAÑOLA DE FAMILIAS DE PERSONAS SORDAS
SPANISH CONFEDERATION OF FAMILIES OF DEAF PEOPLE

Funded by:

GOBIERNO DE ESPAÑA
MINISTERIO DE EDUCACIÓN, CULTURA Y DEPORTE
GOVERNMENT OF SPAIN. MINISTRY OF HEALTH, MINISTRY OF EDUCATION, CULTURE AND SPORTS

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Attainable reading level will depend the level of spoken language reached.

(Dickinson and McCabe)

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Parents have always been aware of the importance of education for the future of their children, as a fundamental pillar of their autonomy and independence.

In the case of families who have children with deafness, alongside this natural concern, we must also take into account the added particularity in their education of the effect that hearing loss has on the development of spoken and written language, and consequently the difficulties that our children face in accessing the ordinary curriculum, which leads to limitations in their learning.

Substantial progress has now been made in relation to hearing impairment in different areas: health, technology, methodology, etc. In addition, specific legislative measures are currently in place to protect the rights of persons with disabilities, and in particular hearing-impaired persons.

However, these advances have not led to major improvements in educational practice aimed at deaf students, who in many cases still do not attain a high enough academic level to complete their professional training and/or access higher education so as to allow them to enter the world of work and achieve full social integration.

The Association Movement of Families-FIAPAS, consolidated in Spain as the state platform for the representation of the families of deaf people, established on the basis of the FIAPAS Confederation, decided to conduct the study we here present, in order to ascertain, assess and analyse the educational reality of students with deafness in Spain.

This Study is part of the actions provided for in the Collaboration Agreement for the improvement of educational provision for students with special educational needs associated with hearing impairment that FIAPAS has, since 2005, had in place with the Ministry of Education, and has also received the support of the ONCE Foundation.

We trust that the conclusions reached, some of great interest given the novelty of the evidence supporting them, will serve to design intervention strategies in line with the current reality of people with deafness in Spain, to improve the academic performance of these students, ultimately enabling access to better vocational and employment options for our children, without anything or anyone limiting their education.

Mª Luz Sanz Escudero
President of FIAPAS

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* The FIAPAS SAAF Services have been working since 1998 within the framework of the Family Care and Support Programme promoted by FIAPAS and funded by the Personal Income Tax Allocation (currently by the Ministry of Health and Social Policy) and the ONCE Foundation.

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Presentation

We are currently witnessing substantial changes in the area of hearing impairment of various kinds: medical, audiological, educational and technological. The situation is such that, thanks to these advances, we already have a new generation of children and young people with deafness for who have expectations of development and access to education that we could not imagine just eight or ten years ago.

This situation, and the new resources available to these students, their families and their teachers, invite us to make some reflections. On the one hand, about what will be the meaning of deafness in these new generations. On the other, about what implications (of all kinds) this evolution poses, requiring changes and updates in the educational response to deaf students, and those generated by the management and application of these resources in defining educational and intervention models that allow us to overcome old and limiting stereotypes about this school population.

The natural concern that, as a family organisation, this arouses in our association environment (between parents and professionals; between our political and social partners) in terms of our knowledge of the educational situation of deaf students, together with the search for answers tailored to their specific needs, prompted FIAPAS to seriously consider the urgency of carrying out a study to approximate this educational reality.

The fact is that today we are better off than we were thirty, twenty, ten or five years ago. As a result, educational and intervention models cannot be based on opinions or wishes or personal experiences from past times as if nothing had progressed since then. It is already a fact that Science and Technology, in partnership with a renewed Pedagogy, can contribute to effectively solving the critical question regarding the education of students with deafness: access to reading and writing skills as an essential instrument to become autonomous in learning.

We have the opportunity to overcome the situation of disadvantage that affects many deaf people and the often-cited *marginalisation* (educational, cultural and social) traditionally used to describe the situation of this group. Both motivated not only by the lack of communication, but –and above all– by the lack of access to auditory stimulation and oral language in the early years of life and, consequently, to the different cognitive skills that depend on it, among others, those linked to fundamental instrumental learning such as literacy.

Results and approach to proposed conclusions and measures

This study highlights empirical evidence of the real and more current situation of students who demand not only quality and fairness, but efficacy.

In other words, their time at school should allow them, from the acquisition of basic skills onwards, to attain sufficient skills, knowledge and experience to integrate learnings, to seek and use information and knowledge in the tasks they face in their education and training process, but also in daily life in their environment, as advocated by the international consensus in this sphere, since the development of basic skills not only makes sense of schooling, but also gives concrete form to the right to Education of every child.

It should be noted that, according to the proposal made by the European Union, the eight basic skills that make up the set of essential learning include *language communication skills* referring, according to the Spanish adaptation by the Ministry of Education and Science, to "the use of language as an instrument of oral and written communication (...)". In fact, among the pedagogical principles behind the organisation of teaching in each educational stage within our legislative framework, including infant education, reading comprehension, oral and written expression are specifically cited as a specific focus for work, but also as an objective present in all areas of teaching.

In addition, the great importance and unique role that has, within this same framework, been given to reading and writing skills as a tool to access the ordinary curriculum and as a competency that lies at the base of all learning: "Reading is a fundamental competency for the training of the individual and an essential requirement for the economic and cultural development of societies (...)" (PIRLS 2006 Study, *Progress in International Reading Literacy Study*, of the International Association for the Evaluation of Educational Achievement).

In any case, and as Spain's Education Act 2/2006 (the 'LOE') itself states in its Preamble, training must be conceived as a permanent process throughout life, hence the need to provide students with a complete education, covering the basic knowledge and skills that are necessary in today's society, while stimulating their interest in continuing to learn and the ability to learn for themselves.

The serious problem that many hearing-impaired students encounter when learning to read is well known. It is therefore important to highlight that through this study, we have identified a group of students who, as a group, deviate from the usual tendency towards very low levels of literacy proficiency. This is thus a major new insight that this Study provides compared to others published to date.

It also draws attention to the fact that, in certain circumstances and with certain resources (and this must be underlined, since neither all methodologies nor all resources serve this purpose), there are deaf students who have reached an average reading level comparable to that of their listening peers.

It is also found that, together with other variables described, it is the level of (spoken and written) oral language of these students that has mainly influenced this result. This should not be surprising, since no one is hiding the fact that in order to read one must know, decode and interpret, and understand the language (oral code) in which the text is written.

Likewise, progress towards more complex language, creativity and a deeper exploration of one's own language, and through it knowledge, is found to be performed by higher-level readers and that reading comprehension is an essential, if not unique, condition for improving school performance.

As a result, it is empirical evidence that must guide and help define educational policies and the design of the most qualified training of the teachers in whose hands lies much of the responsibility to carve out the future of their hearing-impaired students: With the existing programmes and audio-prosthetic, technological and educational resources, it is possible - and vital - to engage with educational and schooling models, logistical intervention and support for families, which systematically, functionally and from an early age, at the developmental point that naturally corresponds to each stage of language development, and sharing a language code with their parents (more than 95% of children with deafness are born into hearing families), consider the acquisition of oral language not only as a desirable and necessary objective, but also as possible. And in any event essential, so that, beyond the entertainment or database society, deaf people can also make the transition from the Information Society to the Learning and Knowledge Society.

Acknowledgements

We publish this Study with the intention that it should serve as an instrument for improvement and for the encouragement and opening up of other avenues of analysis, exploring in greater depth the issues indicated here, and which will require specific studies. After a brief but necessary review of the issues that have historically marked research on the deaf population, proposing how they are resolved in this Study or how they have affected it, the object of the Study is thus defined, methodologically described, and the results and discussion leading to a series of operational proposals are presented by way of conclusion. A practical glossary of terms and an updated and consistent bibliography complete this publication, which also includes illustrative graphics and documentary annexes.

We cannot conclude this presentation without mentioning that this Study would not have been possible without the initiative of FIAPAS as its sponsor and driver, having received funding for this purpose from the Ministry of Education and Science, within the framework of the Collaboration Agreement that it has had in place with FIAPAS since 2005, and also from the ONCE Foundation.

Meanwhile, the intervention, knowledge and experience of the professionals involved in the Expert Group that conducted the study was fundamental and substantial. The support provided by the FIAPAS Management Team, in data processing and in document and administrative management, and the dedication and contribution of the professionals of the Family Care and Support Services of the FIAPAS Network were also essential.

Lastly, and in particular, we should point out that this Study would never have been possible without once again relying on the time and generosity of the families whose children have participated in it and whose collaboration is yet another example of their anonymous and selfless contribution, as parents, to improving the quality of life of these and other future generations of deaf children.

We are all aware that this improvement inexorably depends on their right to education. To a standardised, inclusive and quality education, sharing and participating in the same education system as all other schoolchildren, without the need for answers that circumvent it. In short: on equal terms so as to have equal opportunities and be able to exercise their ultimate right to go as far as they choose in accordance with their abilities and interests and, when the time comes, with the ability to make their own decisions.

Carmen Jáudenes Casaubón
Technical Director of FIAPAS

1. Introduction

THEORETICAL REVIEW. CRITICAL ISSUES IN THE EDUCATION OF DEAF PERSONS

Cognitive-linguistic deficit

Historically, a causal relationship has been assumed between hearing impairment and cognitive-linguistic deficit. This relationship or correlation may exist but, as Vernon (1968, 2005) observes, it would not be caused by deafness itself but by the clinical, socio-familial, educational and re-educational environment. Meanwhile, *correlation does not imply causality*, but rather the mere finding that some variables change, in the positive or negative sense, when the variables with which they are related change.

Correlations have thus been detected between the degree of deafness and speech intelligibility and reading level (Conrad, 1979; Alegría, 2004); between early attention, before 6 months of age or later, and cognitive and linguistic development (Yoshinaga-Itano, 2003); between deafness and equal opportunities and quality of life (Díaz-Estébanez et al., 1996); between the augmentative communication system (ACS) used before 3 years of age and the phonological development achieved (Alegría, J. & Lechat, J. 2005); between the use of words vs. gestures in early stimulation and the first grammatical structures, oral vs. signed (Butcher & Goldin-Meadow, 2000); between the use of different ACSs and the mastery of the grammatical lexicon (Santana, Torres & García, 2003); between maternal language addressed to the baby and the baby's attention to the input (Torres, Moreno-Torres & Santana, 2006); between ACSs used by parents and the first utterances of children, signed vs. oral (Moreno-Torres & Torres, in press); between oral linguistic competency and self-esteem (Silvestre, N. et al., 2006), etc.

Despite all this, the linguistic development of deaf people remains a mystery.

Early acquisition of oral language

Early Care is an expression that encompasses different actions, all of them decisive for the terminal reading level and the future school performance of a person with hearing impairment (cf. White Paper on Early Care, RPSPM Early Care Group, 2000). Early action is a very important variable, but it is no less important to make good decisions about communication, the type of hearing aid, the training of parents and school choice. All of this will in combination mark the attainable reading level and school performance.

Listeners come into contact with the oral language of their environment from the moment of their birth, or perhaps earlier (Peña, Maki, Kovacic, et al., 2003; Christophe, Mehler & Sebastian-Gallés, 2001; Nazzi, Bertoncini, Mehler, 1998; Bijeljac-Babic, Bertoncini & Mehler, 1993; Mehler, J., Jusczyk, P., Lambertz, G. et al., 1988). During their first few months of life they receive an oral input under exceptional conditions, the *motherese* or *baby talk*, which makes it easier for them to acquire speech. Some peculiarities of this directed language are: slower tempo, clearer articulation, higher tone, simpler grammatical structures, repetitions and limited lexicon (Anula, 1998; Kulh, 2000). Around one year old, the listener, after receiving a limited amount of speech, begins to produce language. However, in the absence of early prosthetic adaptation, followed by the necessary oral language stimulation and family orientation, the deaf person does not receive oral input or what they receive during this period is very poor, which poses the greatest threat to their normal cognitive-linguistic development (Goldin-Meadow, 2003). This delay increases dangerously quickly (Yoshinaga-Itano, 2003).

It is therefore urgent to adopt compensatory measures before the end of the critical period for linguistic development (Locke, 1997), e.g.: prosthetic equipment, speech therapy intervention, augmentative communication system, technical aids, training and support for families.

Communication options

Oral communication has been the most prominent form of communication over decades or even centuries. Inevitably so since one of the goals of the school is the acquisition of reading as a means for autonomous learning, as reading is the written mode of oral language. But while the goal was clear, the resources to achieve it were insufficient and/or inadequate, judging by the results.

Deaf people entered school with few oral language skills. Which is why the dominant oralism throughout the 20th century has resulted in so many failures of schooling. These failures include the low terminal reading level and the low competence in oral language, on which reading is intrinsically dependent (Alegría, 2004; Paul, 2003, for each review). Research has been conducted into the reading level of deaf students in different languages and cultures, and results have consistently confirmed the low reading level of deaf persons (Conrad, 1979; King & Quigley, 1985; Oakhill & Cain, 2000; Torres & Santana, 2005). One unanimously accepted conclusion is that the attainable reading level will depend on the level of oral language achieved (Dickinson and McCabe, 2001).

In this country, a study was carried out on a population of 221 deaf students, 163 oral students and 58 bilingual students (sign language/oral language), aged between 3 and 18 years. The main results showed a positive correlation between the communication mode and the acquisition of spoken and written oral language, in favour, in both cases, of the oral mode (Silvestre & Ramspott 2003;2004).

Given the widespread reading failures of deaf students, the education system has progressively changed its methodological approaches, sometimes imported from educational models that were not even scientifically proven successful in the native languages.

Perhaps now, with the technological resources available and the renewal undergone in schools and teaching-learning processes, intervention methodologies aimed at the acquisition and development of oral competency (Geers, 2005, for one review) can be used as a possible and necessary objective to achieve good academic and reading standards.

It is, then, a question of taking advantage of the extraordinary benefits of digital technology, which has led to a radical change in the acquisition of oral language. And at the same time, of being guided by scientific research data that indicate that aspects of oral language that are represented in written text can be acquired by using oral communication support systems that make speech visible (such as cued speech), coupled with cochlear implants (Colin, Magnan, Ecalle and Leybaert, 2007).

Deafness, oral language and reading

A lay observer readily intuits that severe or profound hearing impairment, if pre-lingual, imposes serious restrictions on the development of spoken language. However, that same observer does not so easily infer that deafness imposes restrictions on learning to read, since in principle nothing prevents the deaf person from perceiving the written symbols.

However, empirical data from the past five years consistently confirm the great limitations that deaf people experience in reading (Conrad, 1979; Kyle, 1981; Asensio, 1989; Harris and Beech, 1995; Bresson, 1996; Alegría, 2004, for one review; Villalba, Ferrer and Asensi, 1999; and Torres and Santana, 2005, for one Spanish population).

Another empirical finding is the slow progress of deaf students in learning to read throughout schooling, when compared to their hearing peers. Research by Harris and Beech (1995), Paul and Jackson (1993) finds that the reading gap between deaf students and listeners increases with years of schooling. In other words, as they continue up through school, fewer of them maintain the reading level of their hearing peers (Traxler, 2000). Allen evaluated subjects for admission to higher education and found that their reading level was equivalent to that of a student in 3rd year of Primary. Only 7% of his subjects had a reading level equivalent to 1st year of Compulsory Secondary Education.

The overall data set shows that the terminal reading levels of deaf people are very low. They reach an average reading age of 8-9 years at the end of Secondary (Torres and Santana, 2005, with Spanish samples). These authors find differences in reading age between deaf and hearing people ranging from two to eight years, with the average difference being five years. Paul (1998) and Traxler (2000), with English samples, place the average reading level of deaf youngsters aged 18-19 as comparable to that of hearing children aged 8-9.

Deaf people find it relatively easy to acquire the basic levels of the reading process: phonological awareness, alphabetic principle, decoding and word recognition; however, they have serious shortcomings in the higher processes involved in the comprehension of the text, such as: general knowledge to integrate and make sense of the text, vocabulary poor in quantity and quality, familiarity with complex syntactic structures, verbal reasoning skills, among others. These shortcomings explain many differences between deaf students and their hearing peers (Villalba, 2005; Traxler, 2000; Harris and Beech, 1995; Paul and Jackson, 1993).

In the aforementioned study conducted in Spain by Silvestre & Ramspott (2003;2004), a U-shaped curve evolution was observed. In the initial acquisition of written language, then, deaf students experienced little lag compared with hearing peers, but this lag increased in the primary and compulsory secondary stages (in secondary school, only 22% reached the highest levels of literacy proficiency).

Technological advances

In recent years, research on cochlear implantation and oral language competency has been on the increase. Research highlights that different factors influence the overall progress that deaf children experience with their cochlear implants (Geers, 2006, for one review). These factors include age at implantation, communication method, vocabulary skills, residual hearing before implantation and family engagement.

In relation to reading performance, McDonald & Zwalan (2005) conducted research with 91 pre-lingual profoundly deaf subjects with cochlear implants. Their data show that subjects with better language skills achieved higher reading performances and that the age of implantation had significant effects on post-implant vocabulary increase and reading level, both increasing the earlier the cochlear implant was applied.

Difficulties of research with deaf people

Research on people with deafness has certain peculiarities, methodological biases that should be highlighted. Only then will the data be properly interpreted.

– Shortage of homogeneous samples: neither the variable chronological age nor the year in which they are enrolled, particularly in the case of primary school students, are good indicators. Chronological age places them at specific educational stages, with exceptions that do not correspond to their level of cognitive-linguistic knowledge and skills. Comparison with their hearing peers does not yield reliable results in these circumstances.

– Mismatch between chronological age and school year: with deaf students it is difficult to apply the chronological age criterion successfully, since at best a deaf subject may go through the same evolutionary stages as a hearing subject, but does not do so at the same time (Gregory and Mogford, 1981; Marchesi, 1987; Moreno-Torres and Torres, 2007, in press). The result is that students with deafness are in the year that corresponds to them chronologically until the end of primary education, where a high percentage of the weight of the assessment falls on skills and a low percentage on content. The subject may thus complete primary education according to their age, but will often not be ready to undertake compulsory secondary education.

– Intra-group variability: With small samples, this variability may weaken the significance of the data. When a large sample is obtained, then there is the bias of the disparity of educational models, different languages, different integration policies, etc.

– Variety of communication methods: this prevents homogeneity of comparable groups. The lack of definition of groups is one of the greatest difficulties in obtaining and interpreting data. Not knowing how each communication system influences leaves no valid arguments for choosing one over the other, falling into a petitio principii.

– Extreme distorting cases: this bias always occurs, but while in the hearing subjects it is necessary to "clean" the data of extreme cases, since the mean is sought, in the case of deaf people it is not advisable to eliminate these cases, since they provide valuable information. The worst cases serve to narrow down what went wrong, while the best cases serve to understand what worked. To avoid this bias, use should be made of single case studies or very small groups and the use of non-parametric tests, which presuppose little symmetry in the population and make it difficult to test hypotheses regarding parameters.

– Assessment tools: the tests are usually validated with listener samples and designed to evaluate listeners. As a result, interpretation of results may also be affected. In short, the generalisation of results is compromised.

2. Purpose

The purpose of this Study is to ascertain the educational status of students with hearing impairment. To this end, two parameters have been taken: **reading level and academic performance**, as these are two core school objectives and allow objective quantification.

As this is a **cross-sectional sample study**, the statistic obtained is a snapshot of how the subjects are at the time of assessment.

So far this would be one further study of the scholastic and reading performance of deaf people, a mere sociological curiosity, since in order for the study to make prospective proposals, it is necessary to carry out a retrospective analysis to explain why the current situation shown by the data has been reached.

Therefore, in order to answer this question, which is the truly important matter, data on the personal, sociophysical, audioprosthetic, (re)enabling and educational history of the subjects in the sample have been collected.

The intergroup comparison and regression analysis also provides information on the current situation of the subjects and the circumstances that caused it.

In short, **the conclusions** resulting from this analysis **will allow for the planning of responses** that are aligned and appropriate for the real needs of these students, thereby offering today's deaf students and their families **proven and up-to-date educational opportunities.**

3. Method

3.1. PROCEDURE

The Study was structured in two distinct phases: The first (May-December 2005) focused on the task of research design and planning. The variables to be studied, the universe and design of the sample and the procedure to follow for data collection were thus established, preparing the documentation required for this.

In the second phase (January-December 2006), data collection, processing and analysis were performed and the Final Report was drawn up, setting out the results and conclusions reached. Finally, during 2007 work was carried out on the Final Report in order to prepare this publication.

To conduct this Study, an Expert Group was established, composed of professionals of recognised standing and with extensive experience in the field of research and hearing impairment.

Sample configuration and selection

The sample was defined by selecting subjects from four of the school years considered most significant within the compulsory education stage. The criterion established to obtain the sample was thus to have completed, during the 2005-2006 school year, the following years:

– 3rd and 4th year of Primary Education, given the importance of literacy proficiency at this level of education as a fundamental cognitive tool to embark on the path of autonomous learning, which these students have just started and will accompany them throughout their academic, professional, cultural and lifelong education.

– 3rd and 4th year of Compulsory Secondary Education, since aside from the above, they are also the years that draw the line between students who continue their education and those who, as a result of academic failure, leave the system.

Two groups are thus established: Primary and Secondary, with the aim of being able to compare the level of literacy proficiency, analysing the influence of certain prognostic factors on the academic outcome of students with deafness.

Given the need to understand the universe from which to establish a representative and territorially balanced sample, it was considered appropriate to address the Departments of Special Education of all Spain's Autonomous Regions, requesting information on the number of students with deafness enrolled in Primary and Secondary education, both in ordinary schools and special education centres specific to students with hearing disabilities.

Based on this information, the sample was configured to request the collaboration of the families of our Association Movement, in accordance with the demographic criteria necessary to ensure the representativeness and territorial balance of the area.

Given the specialist training of the professionals responsible for the Family Care and Support Services (SAAFs) at FIAPAS, it was determined that these professionals should be responsible for data collection and test application. Lastly, the professionals from 26 SAAFs of the Family Care and Support Network of FIAPAS participated, receiving the necessary information about the purpose and procedure to carry out the Study, as well as the necessary training and guidance for the application of the psycho-linguistic tests selected for data collection, which were provided by FIAPAS. At all times they had access to advice from the Expert Group to consult on any doubts that might arise in this field work.

Using the statistical software SPSS (Statistical Product and Service Solution), a Psychology fellow performed the coding and statistical processing of the data obtained. These were subsequently analysed and assessed by the Expert Group, the Final Report being drawn up and this publication being prepared.

Variables to be studied

The Expert Group developed a Questionnaire for the collection of data on the personal, family and school history of the students participating in the Study.

A number of psychological tests were also selected (see pp. 25 and 26) in order to be able to analyse the following objective variables:

- Intelligence
- Phonological awareness
- Literacy proficiency
- Spoken oral expression
- Written oral expression

With regard to school performance, it was agreed to collect information from the first, second and third assessment grades in the following subjects:

- 3rd and 4th year of Primary: Spanish Language and Literature, Mathematics and Knowledge of the Environment.
- 3rd year of Compulsory Secondary Education: Spanish language and literature, mathematics, biology, physics and chemistry, social sciences and geography.
- 4th year of Compulsory Secondary Education: Spanish language and literature, mathematics (A or B), social sciences, geography and history, biology or physics and chemistry.

3.2. SUBJECTS

After data collection, the resulting sample consisted of 157 subjects from 23 provinces, corresponding to 13 regions: Andalusia, Aragon, Asturias, Balearic Islands, Castile-La Mancha, Castile-Leon, Catalonia, Extremadura, Galicia, Madrid, Region of Murcia, Navarre and Region of Valencia.

The sample subjects (77 males and 80 females) ranged in age from 8-12 years (92 subjects) to 14-19 years (65 subjects). Of these, 7.3% have a mild degree of loss, 34% moderate, 31.3% severe and 27.3% have profound deafness. In 88.2% of cases this is pre-lingual deafness. In relation to communicative mode, 96% communicate in oral language and benefit from the use of auditory prostheses. Of these, 62.9% use hearing aids and 33.8% use cochlear implants. Meanwhile, it should be noted that more than 95% of the subjects in the sample are enrolled at an integration centre, in 3rd and 4th year of Primary (91 subjects) and 3rd and 4th year of Secondary (66 subjects).

The sample was configured to maintain a balanced territorial distribution , within a group, although it does not allow conclusions according to geographical location. However, it should be noted that the scope of the sample studied is high for this type of research, which legitimises the data offered in this Study and allows the overall conclusions reached to be generalised.

Homogenisation and configuration of final sample

In order to be able to establish a more homogeneous group, a first selection of the sample was made according to two criteria: classification of deafness and associated deficiencies, thus limiting the sample to **pre-lingual deafness and without associated deficiencies**. The resulting sample was 119 subjects.

Given the intra-group dispersion bias of the sample, a new selection of subjects was necessary in order to obtain a sample suitable for the specific objectives of the Study: the assessment of the reading level and how this in turn influences learning and school performance.

The criterion used for this new selection was the **reading level reached**, as it was the most important variable in the subject's school performance and their intrinsic relationship to language, in general, and to oral language in particular. This took into account the score obtained in the "comprehension of texts" test of the PROLEC and PROLEC-SE (Test 10 and 5, respectively).

Two groups were thus configured: one with the higher reading level subjects and another with the lower reading level subjects.

The result was a database of 100 subjects, from Primary School students (52 subjects aged 8-12 years) to Compulsory Secondary School students (48 subjects aged 15-19 years) (Annex I).

This sample was made up of 52 male and 48 female subjects, of whom 24% had a moderate **degree of loss**, 38% severe and 38% had profound deafness. As regards **communicative mode**, 96% communicate in an oral language and benefit from the use of auditory prostheses. Of these, 57% use **hearing aids** and 39% use **cochlear implants**.

Furthermore, it should be noted that more than 95% of subjects are **enrolled in integration centres**.

Subjects in the final sample were grouped as "high-level readers" (N=50) and "low-level readers" (N=50).

The statistical analyses detailed in the following pages were performed on these groups.

3.3. MATERIALS

Data collection questionnaire

Document specifically prepared by the Expert Group for the collection of personal, family and school data on subjects. It contains 115 items grouped into four main sections and their corresponding sub-sections (Annex II).

IQ Test

- TONI-2 Test of Non-verbal Intelligence by L. Brown, R. Sherbenou and S. Johnsen (1994).

  Non-verbal IQ test. It consists of 55 graphical items that are resolved by choosing one answer from six options.

Phonological awareness assessment test

- List of pseudo-words, by Gerardo Aguado (2005).

  Test for the assessment of phonological consciousness. It consists of 80 items (40 pseudo-words made up of 2, 3, 4, 5 common syllables, 10 for each syllable length, and another 40 pseudo-words made up of uncommon syllables, distributed in the same manner). The subject's task is to repeat the pseudo-word they have just heard.

Reading process evaluation tests

- PROLEC, by F. Cuetos, B. Rodríguez and E. Ruano, for Primary Education (1996).

  – *Test 7*: grammatical structures. It consists of 15 items intended to evaluate the syntactic processor. Each item consists of one drawing and three sentences from which to choose one.

  – *Test 9*: understanding sentences. Assess the subject's ability to extract the meaning of simple sentences without the intervention of other cognitive processes. It consists of 12 items or sentences and 12 is also therefore the maximum number of correct answers possible.

  – *Test 10*: comprehension of texts. Within semantic processes, the text communication subtest aims to check whether the subject is able to extract the meaning of texts appropriate to their school level and integrate it into their prior knowledge. It consists of 4 texts of about 65 words each. The subject must read the text and then answer 4 questions (2 literal and 2 inferential) in each text. The maximum achievable score is 16.

- PROLEC-SE, by J.L. Ramos and F. Cuetos, for Secondary Education (1999).

  – *Test 3: syntactic processes. Drawing-sentence pairing task.* It consists of 24 items. Each item has one drawing and three sentences, only one of which is true of the drawing.

  – *Test 5: semantic processes.* A *text comprehension* task evaluates reading comprehension level. It consists of 2 texts of about 250 words each. The subject reads a text and then must answer 10 questions related to the text they have read.

  – *Test 6: structure of a text.* After reading a text, the subject must complete a scheme already started but with 22 gaps to complete.

Narrative discourse assessment tests

- PICNIC oral production test, of the Research Group on Deafness and Disorders in Language Acquisition (GISTAL) (2006, rev.).

  The test consists of a picture book that tells a story. The subject is asked to look at the pictures and then tell the story they have seen in the pictures. Oral expression is evaluated at the following levels: discourse assessment, organisation and cohesion, sentence analysis and error analysis.

- CLOWN written production test by the Research Group on Deafness and Disorders in Language Acquisition (GISTAL) (2006, rev.).

  The test consists of a picture book that tells a story. The subject is asked to look at the pictures and then write down the story they have seen. Written production is valued at the following levels: discourse analysis, organisation and cohesion, sentence analysis and error analysis.

Other

- Global Data Collection Sheet.

  In order to facilitate the coding of all the data collected, the Expert Group prepared a Global Data Collection Sheet, which each professional of the participating SAAFs had to complete with the school grades and results obtained after the application of the different psychological tests.

- Recommendations for the application of psychological testing.

  The SAAF professionals were provided with a document containing the recommendations that the Expert Group considered the fundamental essentials for the correct application of the various tests.

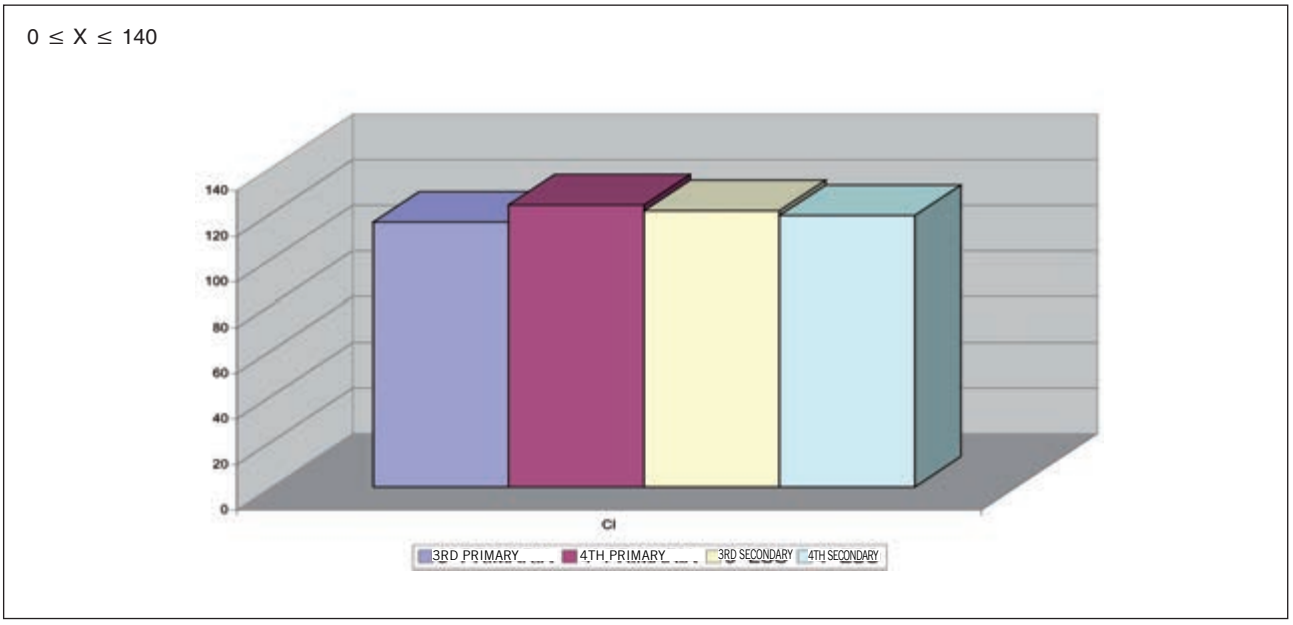
4. Results

4.1. CONTROL TESTS: IQ (TONI-2) AND PHONOLOGICAL AWARENESS (PRsP)

Since the objective of the Study was to assess the reading level of deaf students and academic performance, it was necessary to establish as control tests an IQ test and one related to basic reading processes.

TONI-2, which is a non-verbal test, was chosen for IQ measurement. If in this test the subjects were in the middle-high area of the sample distribution, then low academic results would not be explained mainly by low IQ. The phonological consciousness test was intended to be similar, but in relation to reading.

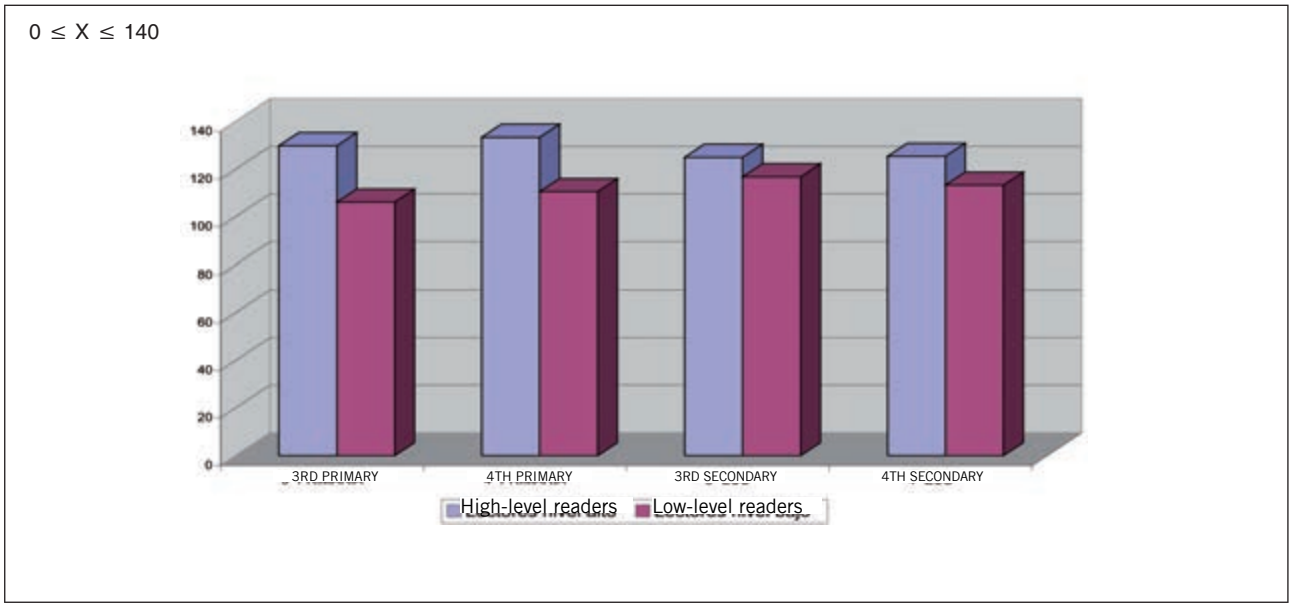
Graph 1. MEAN IQ BY YEAR (N=100)



After typifying the direct scores (DS) obtained in TONI-2 for all subjects in the sample (N=100), a t-test was performed for independent groups. Two groups were very imbalanced in number: a majority group (83 out of 100) with a mean-high IQ ($\bar{X}$ =100) and a minority group (17 out of 100 subjects) with a mean-low IQ ($\bar{X}$ between 81.10 and 99.47), the mean difference between these groups being statistically significant [t(98) 4.939, p<0.001]. However, the whole group was above the typified mean ($\bar{X}$ =100, Sx=15) of the test.

In addition, the sample had, as discussed above, previously been divided, in anticipation of other analyses, into two groups: one with a higher reading level and another with a lower reading level. An ANOVA was performed with these two groups (reading level factor: high and low). **The difference between groups was significant. The high-level reader group was superior to the low-level reader group** in more than one standard deviation in TONI-2 ($\bar{X}_{l.a.}$=128.197, $\bar{X}_{l.b.}$=111.239, p<0.001).

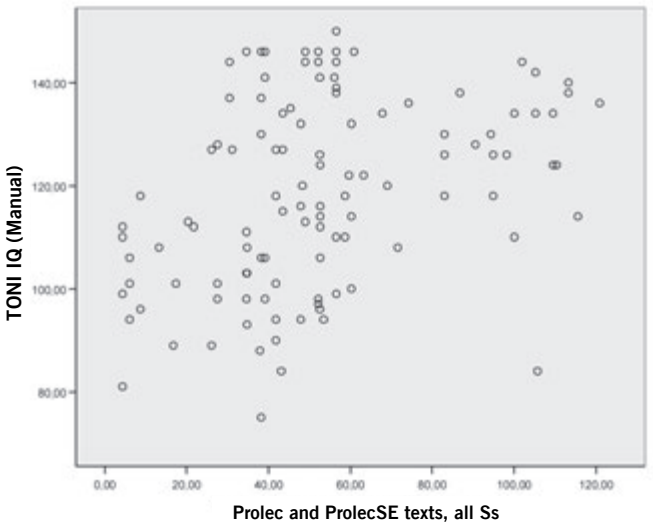
Graph 2. MEAN IQ (N=100)
High-level and low-level readers by year



A **significant covariation between IQ and the independent variables (IV) of age at diagnosis and hearing loss** was found in the step regression analyses to explain the dependent variable (DV) comprehension of texts [F(1.93)=8.709, p=0.004].

The diagram below shows the correlation between reading comprehension proficiency and IQ. It may be seen that the group is normal in terms of IQ, but low in terms of reading level. In other words, an increase in the ordinate dimension (IQ) does not correspond to an equivalent increase in the abscissa axis (comprehension of texts). In other words, the IQ relies more on maturity and structural aspects, while the reading level relies more on previous learnings and specific skills acquired.

Scatter diagram IQ x Text comprehension



The Pseudo-word repetition test (RPsP) aims to ensure the good level of lexical processes. The table below shows the pseudo-word repetition test data for all subjects (N=100), making no distinction between school years or educational stages, but differentiating between pseudo-words with common syllables ($RPsP_{frec}$) and pseudo-words with uncommon syllables ($RPsP_{nofrec}$).

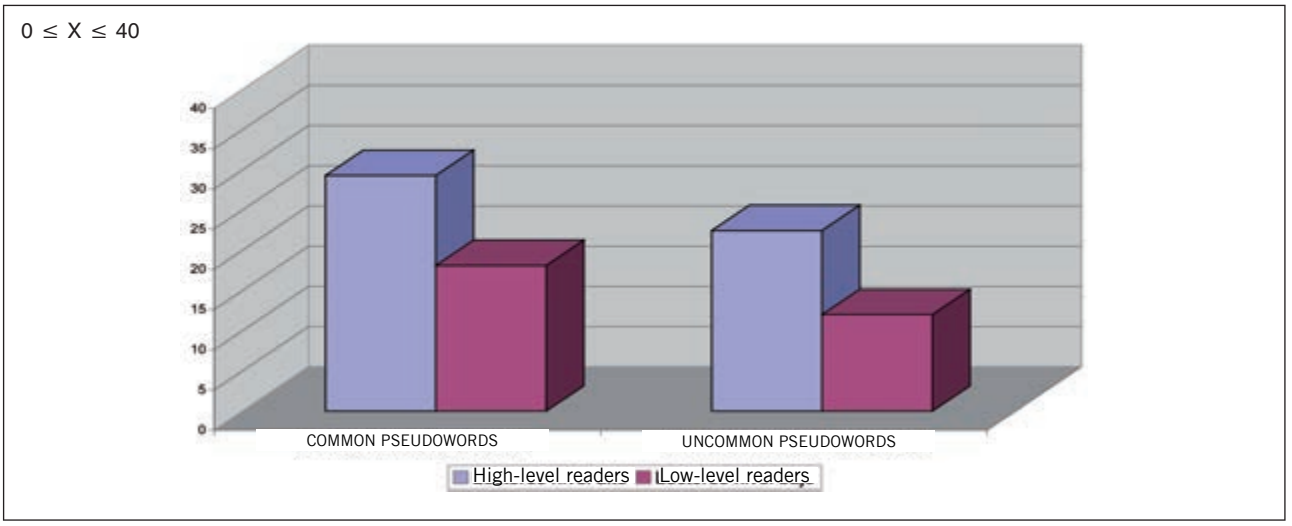
Repetition of pseudo-words with common vs. uncommon syllables

	Pseudo-words with common syllables					Pseudo-words with uncommon syllables				
Number of syllables	2 syl	3 syl	4 syl	5 syl	Total	2 syl	3 syl	4 syl	5 syl	Total
N	100	100	100	100	100	100	100	100	100	100
Mean	7.71	6.71	5.11	4.09	23.36	6.23	5.47	4.00	3.25	18.96
Std. deviation	2.483	2.665	2.906	3.025	9.756	2.342	2.826	2.910	2.738	9.949

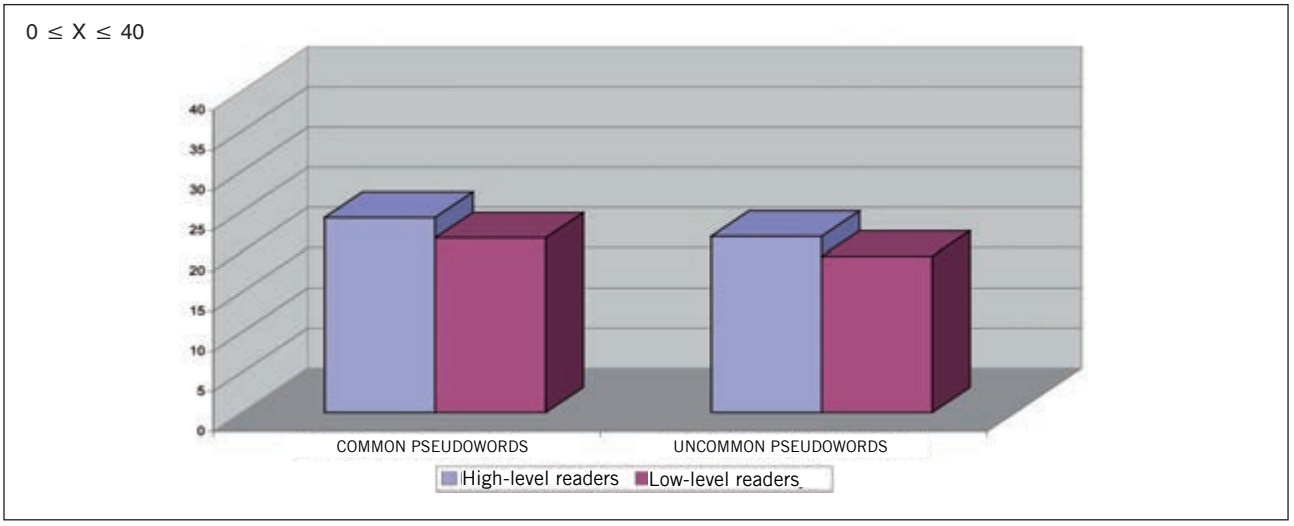
A t-test was performed for independent groups, finding **statistically significant differences between the two pseudo-word lists** ($RPsP_{frec}$ vs. $RPsP_{nofrec}$) [t(96)=9.395, p<0.001], with the $RPsP_{frec}$ group having the highest mean ($\bar{X}_f$ = 23.36 vs. $\bar{X}_{nf}$ = 18.96). The null hypothesis of equality of means is thus rejected and it is found that the list of $PRsP_{nofrec}$ was more difficult for subjects. In addition, the means decrease as the number of syllables increases in both $RPsP_{frec}$ and $RPsP_{nofrec}$.

Other important results found with this test are those related to hearing loss, where in both modes, both with RPsPfrec [F(Brown-Forsythe)=6.696, p=0.002] and with $RPsP_{nofrec}$ [F(2.108)=5.149, p=0.007], the **significant differences are greater the greater the degree of loss**. In other words, it is a test sensitive to phono-articulatory processes.

Graph 3. MEAN PSEUDO-WORDS IN PRIMARY
High-level and low-level readers



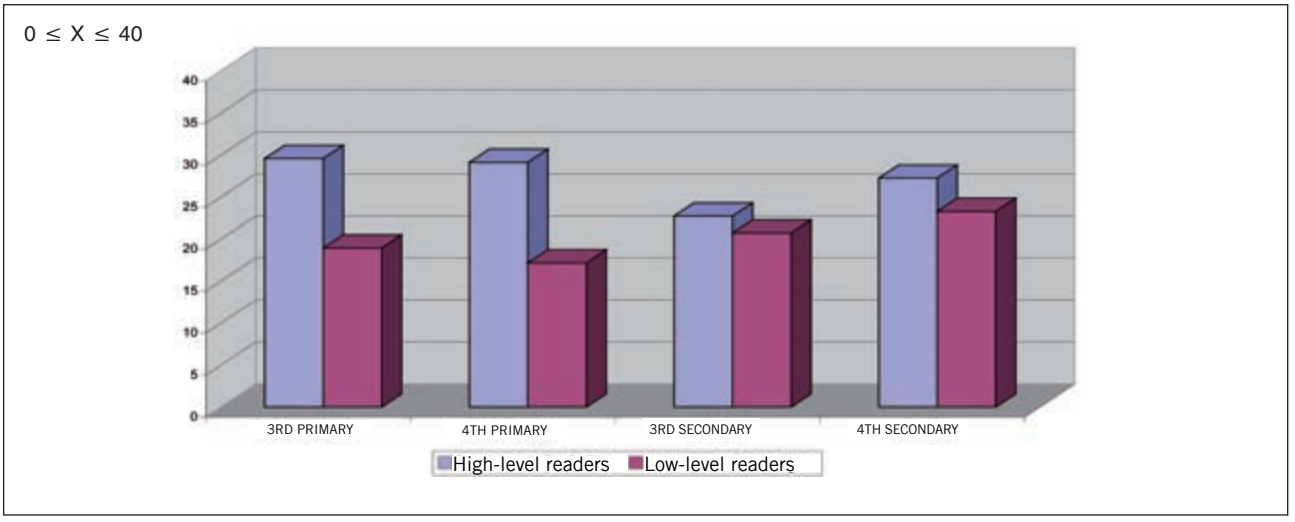
Graph 4. MEAN PSEUDOWORDS IN SECONDARY
High-level and low-level readers



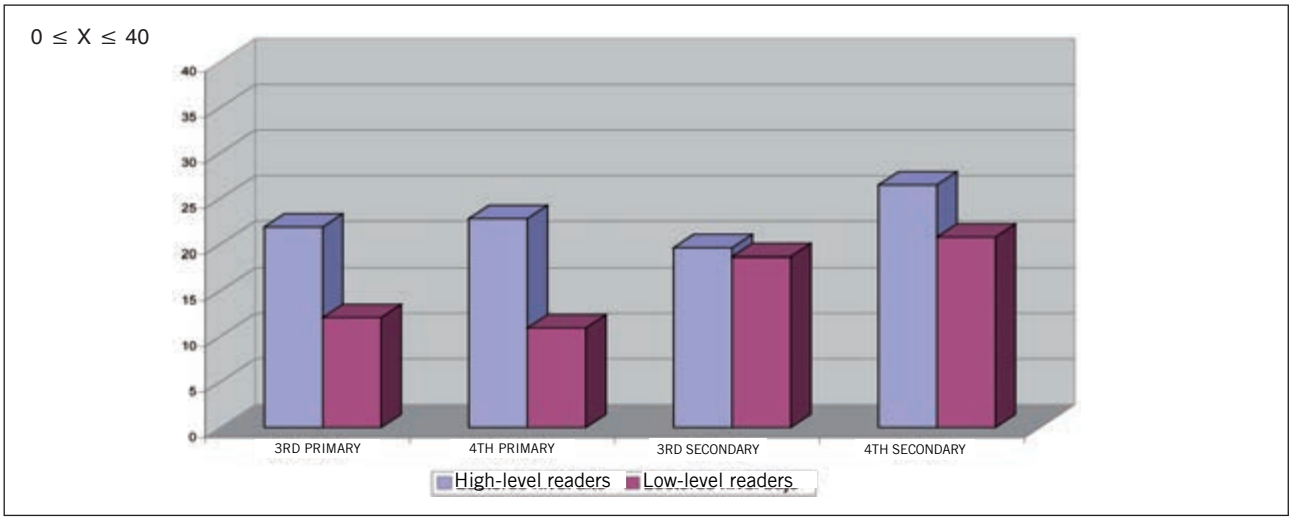
Once the results obtained in the TONI-2 non-verbal intelligence test and the Pseudo-Word List had shown that all the subjects in the sample had basic reading prerequisites, a comparison was made of means between the groups differentiated by their reading level, readers of the higher vs. lower level, **significant differences being found in favour of the group of the higher level readers** [t(97) 3.201, p<0.002], both in RPsPfrec ($\bar{X}$ =26.68 vs. 19.74, p<0.001) and in $RPsP_{nofrec}$ ($\bar{X}$ =21.68 vs. 15.83, p<0.002).

This test is also sensitive to other variables, such as **use vs. non-use of prostheses**, which is particularly noticeable in the $RPsP_{nofrec}$ mode [F(20.48)=1.959, p=0.029].

Graph 5. MEAN COMMON PSEUDOWORDS (N=100)
High-level and low-level readers by year



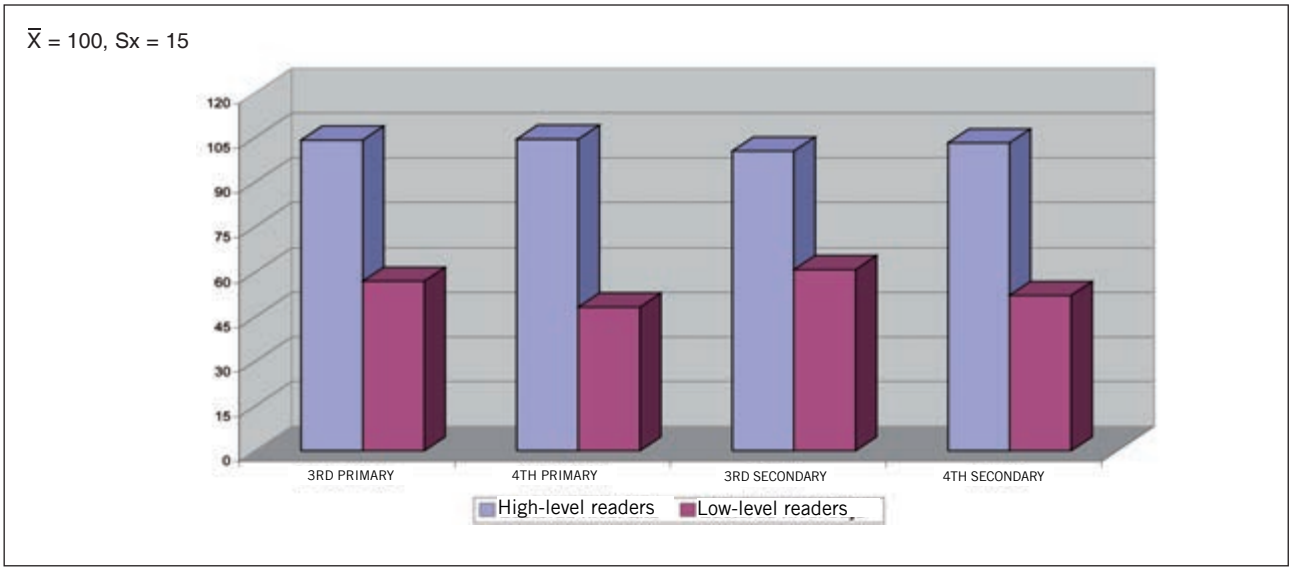
Graph 6. MEAN UNCOMMON PSEUDOWORDS (N=100)
High-level and low-level readers by year



4.2. COMPREHENSION OF TEXTS (PROLEC AND PROLEC-SE)

Maintaining the regrouping of the higher and lower level readers, a t-test was performed for independent groups, finding statistically significant differences [t(98) 19.394, p<0.001], **the group with the best reading being the one with the highest mean** ($\bar{X}$ =102.624 vs. $\bar{X}$ =54.095) and, in turn, the lowest standard deviation (Sx=9.952 vs. 14.838). These data indicate that two distinct groups are formed. The remaining analyses will refer to these two groups, attempting to discover the variables, both qualitative and quantitative, that led to these results.

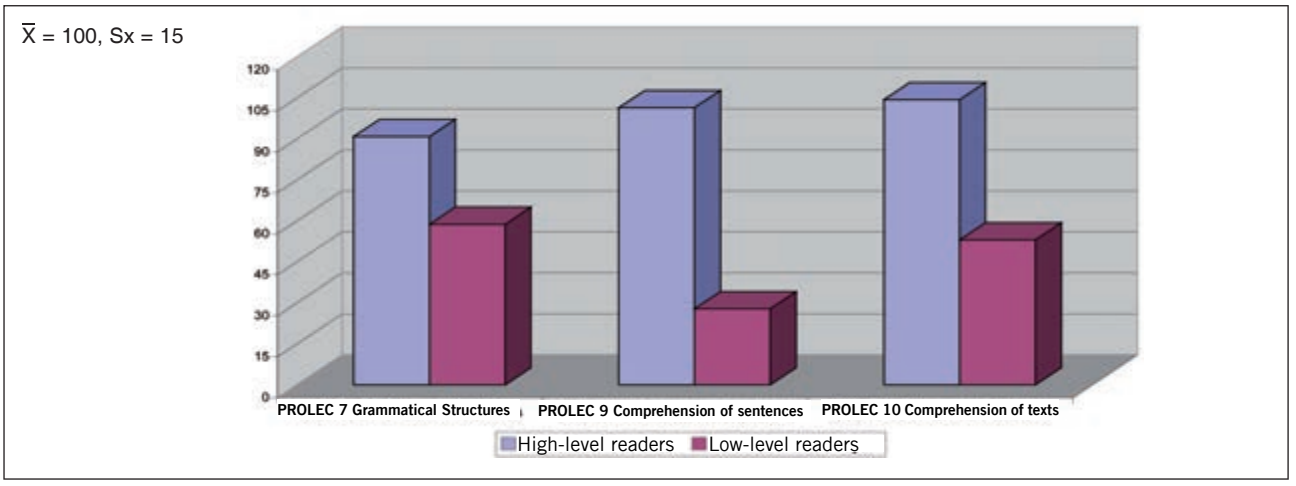
Graph 7. MEAN PROLEC: COMPREHENSION OF TEXTS (N=100)
High-level and low-level readers by year



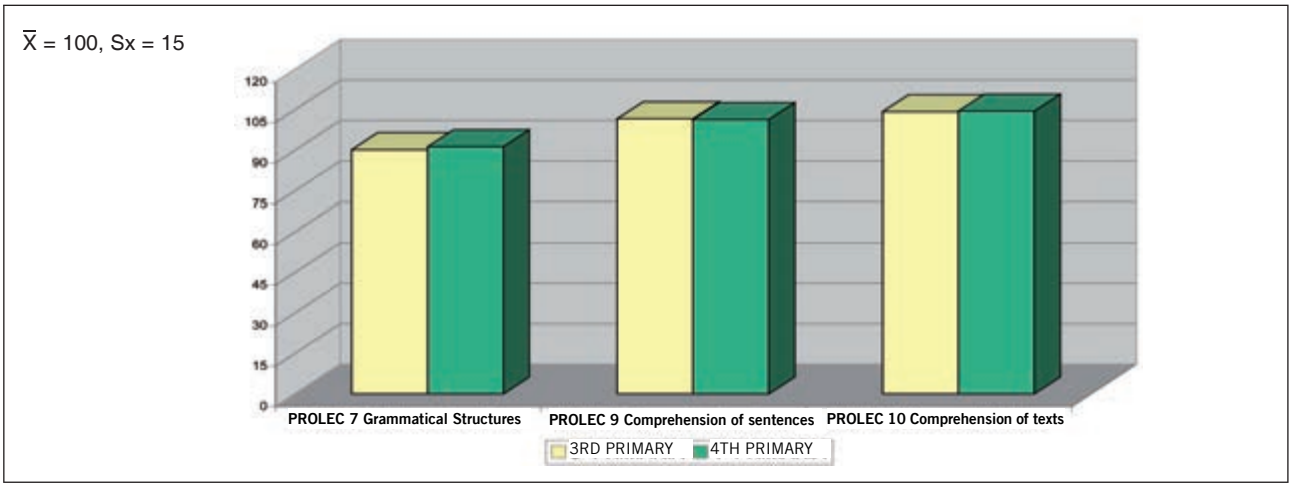
Taking the factor 'sex' as an independent variable, an ANOVA of one factor (male vs. female) was performed with the typified scores given by the subjects, **the statistically significant differences** [F(1, 63.57)=4.024, p=0.049] found being the **mean of male subjects** ($\bar{X}_{var}$=41.13) **is higher than for females** (X_{muj}=33.50).

Curriculum support also seems relevant to the comprehension of texts in the PROLEC with Primary students [F(5.58)=3.536, p=0.007]. The same applies to the use of technical aids, with **significant differences in favour of those using FM *vs.* other aids**.

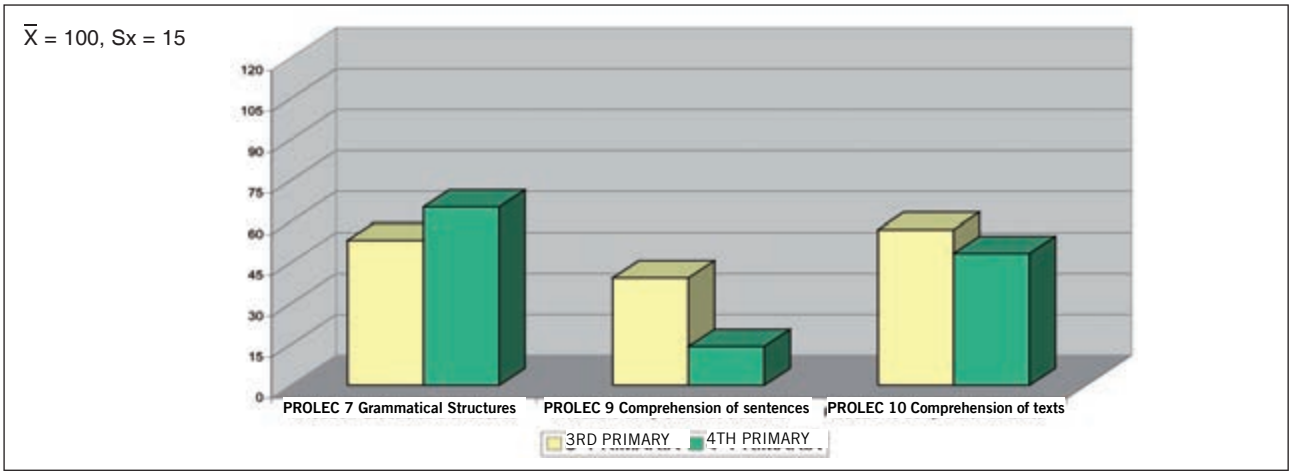
Graph 8. MEAN PROLEC IN PRIMARY
High-level and low-level readers



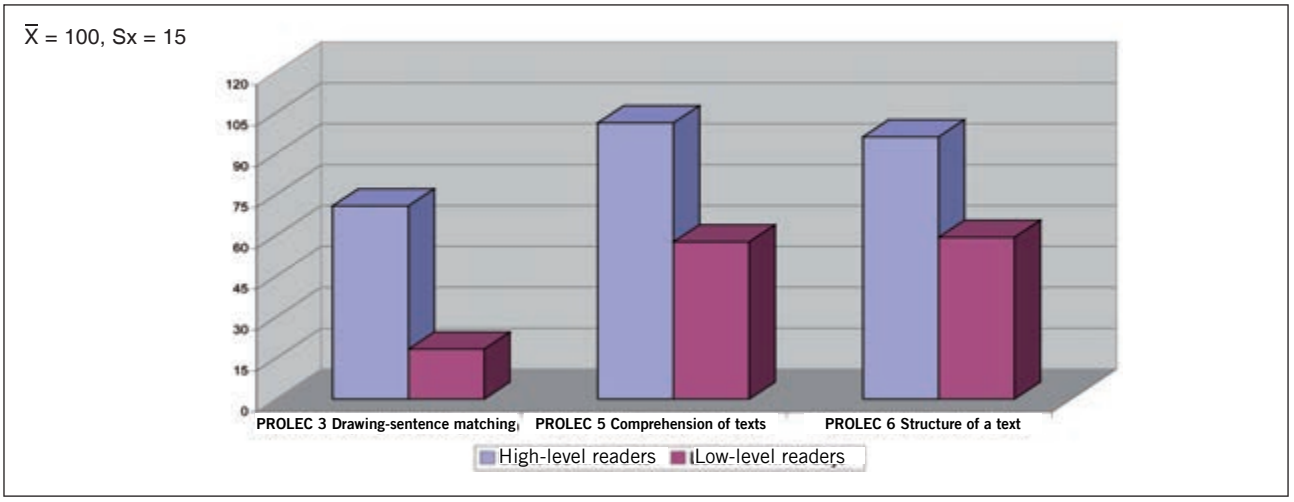
Graph 9. MEAN PROLEC
High-level readers in Primary



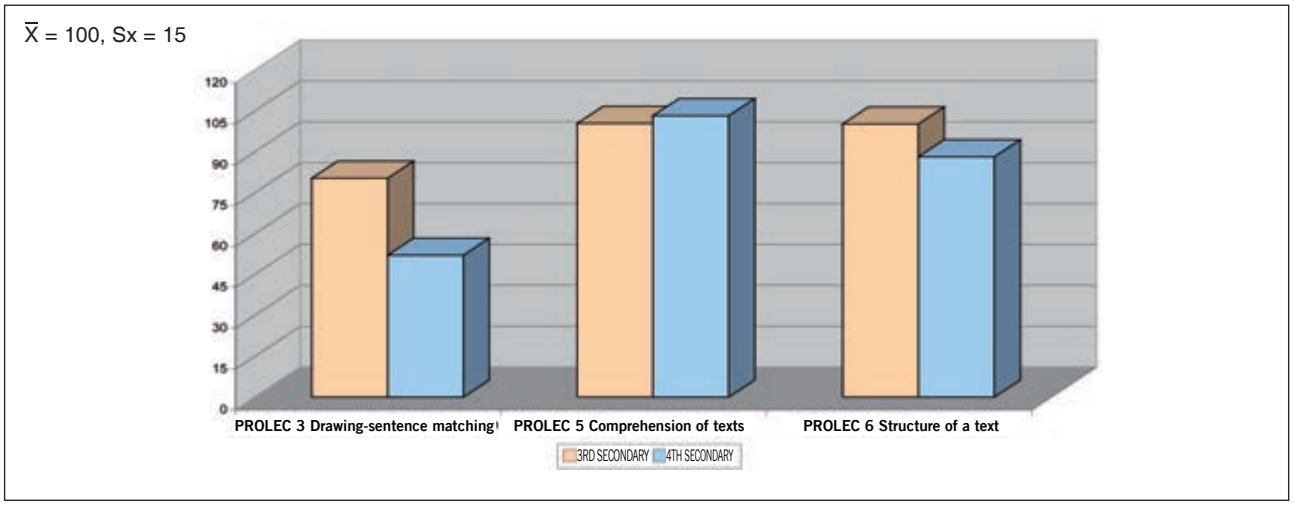
Graph 10. MEAN PROLEC
Low-level readers in Primary



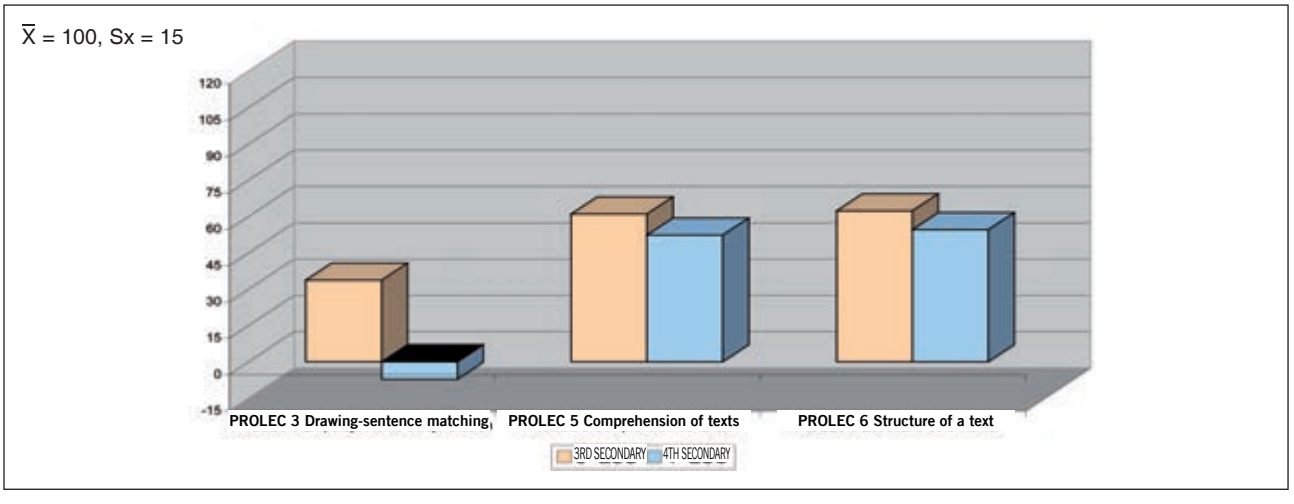
Graph 11. MEAN PROLEC IN SECONDARY
High-level and low-level readers



Graph 12. MEAN PROLEC
High-level readers in Secondary



Graph 13. MEAN PROLEC
Low-level readers in Secondary



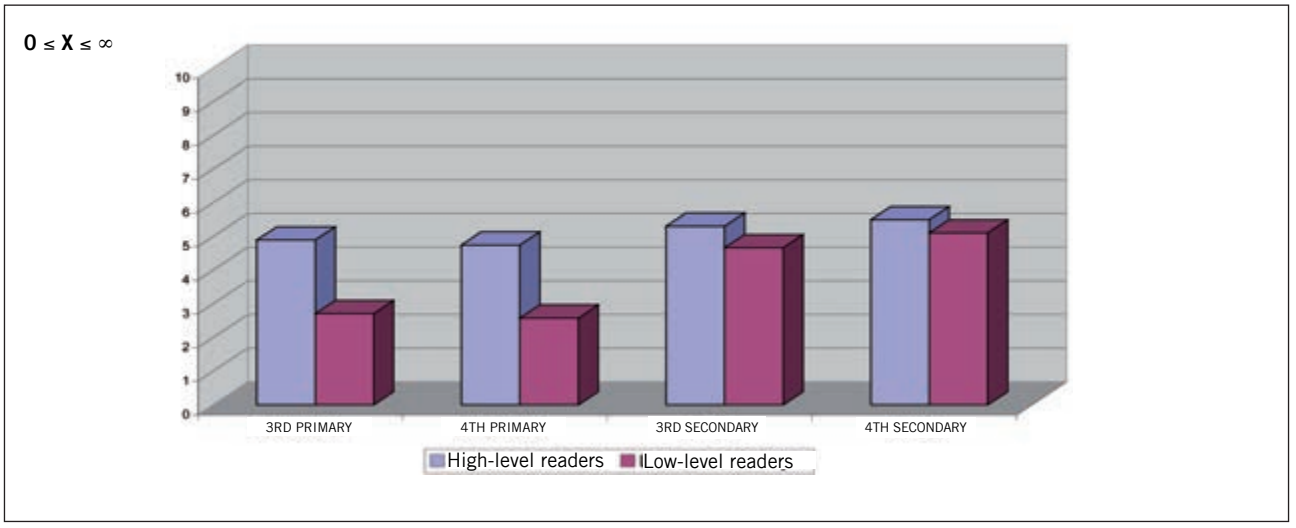
4.3. SPOKEN ORAL EXPRESSION (PICNIC)

Overall, the analysis of the results of this test serves to confirm the strong relationship between competency in the production of oral discourse and in the appropriation of written language.

It should first be noted that the overall mean of the results obtained by high-level readers is higher than low-level readers in all the dimensions studied.

Meanwhile, from the sentence structure perspective, there are differences in the results obtained by **high-level readers** of 3rd and 4th year in both educational stages. 4th year in each stage thus **shows a decrease in simple sentences and an increase in complex sentences**. However, **this progress is not observed for low-level readers.**

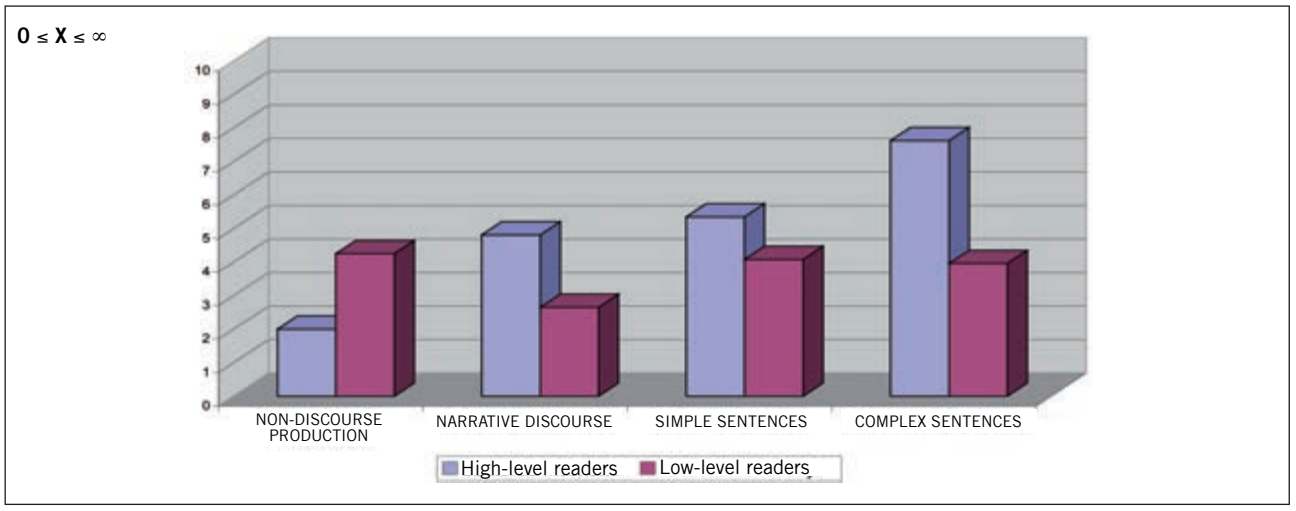
Graph 14. MEAN PICNIC: NARRATIVE DISCOURSE (N=100)
High-level and low-level readers by year



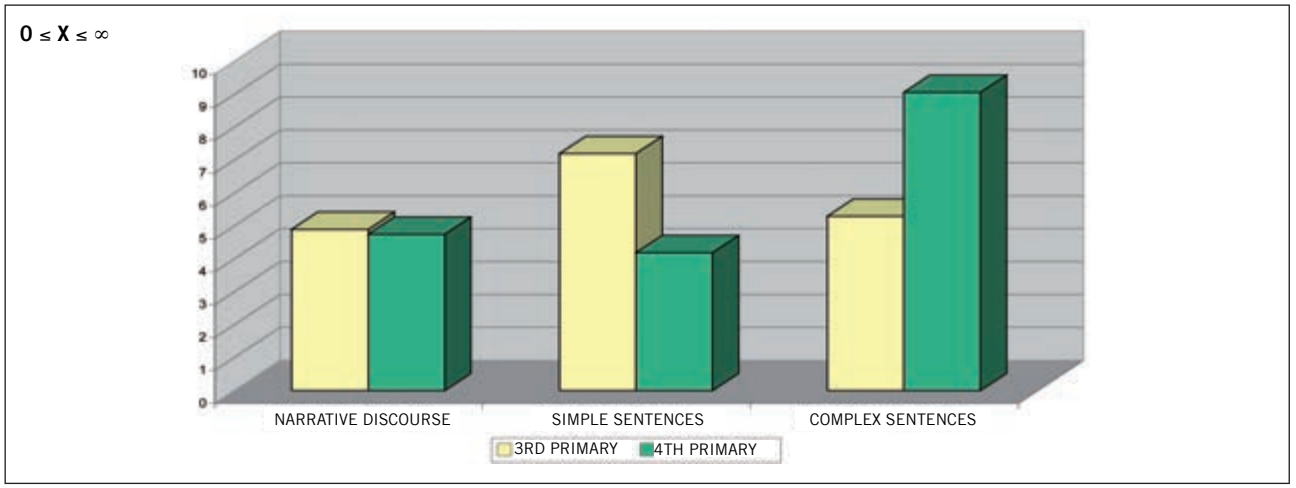
In summary, in both Primary and Secondary high-level readers achieve better results in all oral language dimensions studied, although it cannot always be stated with statistical significance. In this regard, a t-test was performed for independent groups, comparing 3rd and 4th year of Primary. **Statistically significant differences were found between the higher level readers vs. the lower level readers** in both simple sentences [$t(48)=2.259$ $p=0.028$] and complex sentences [$t(48)=5.897$ $p<0.001$], always in favour of the higher level reader group.

Furthermore, if we consider the results obtained in narrative discourse by secondary school students, i.e. the results obtained in the organisation of discourse and referential discourse, the average of the results obtained in each of these aspects of oral discourse (the maximum score being 4 points for each aspect) is clearly lower in the use of cohesive elements to maintain the discourse than in the organisation of the discourse ($\bar{X}=2.22$ and $\bar{X}=3.10$).

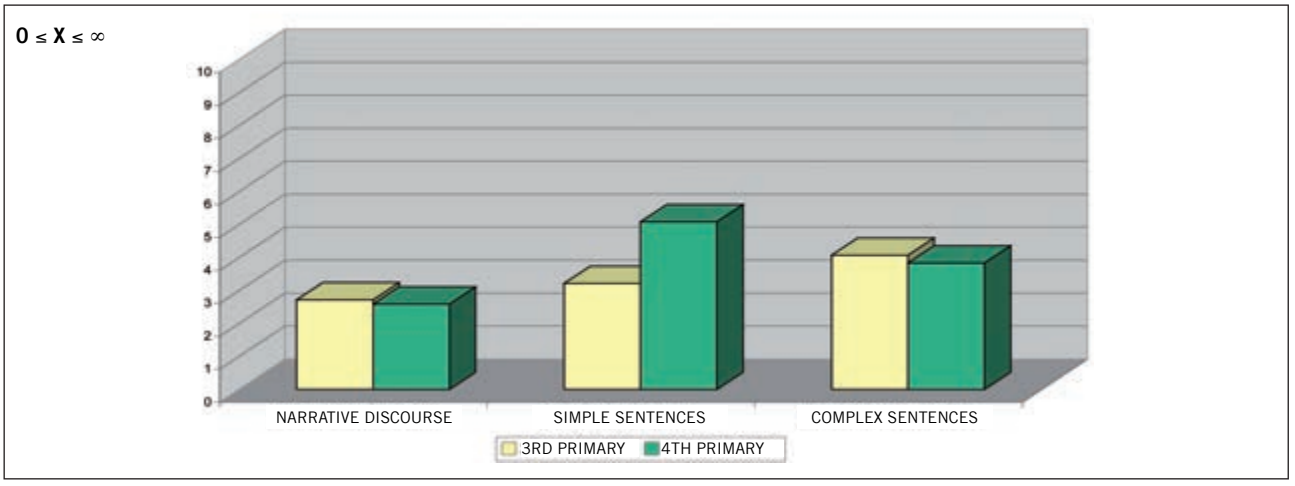
Graph 15. MEAN PICNIC IN PRIMARY
High-level and low-level readers



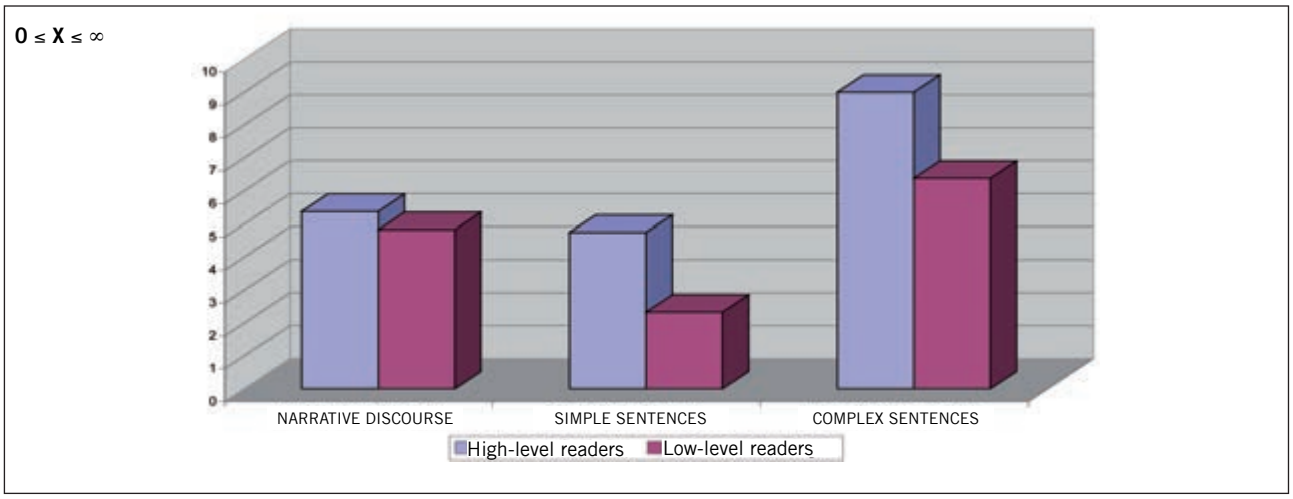
Graph 16. MEAN PICNIC
High-level readers in Primary



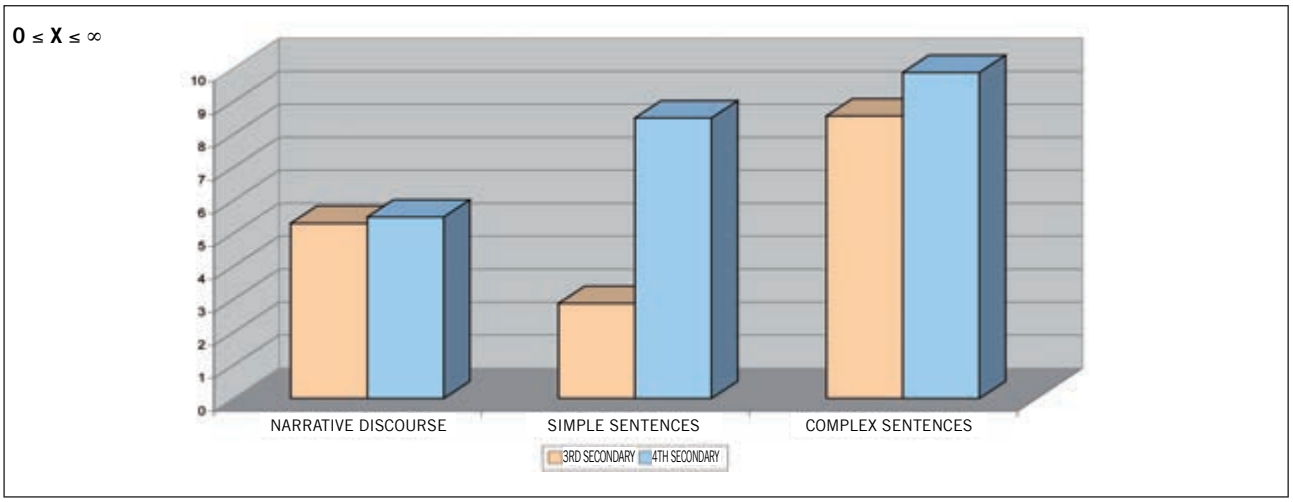
Graph 17. MEAN PICNIC
Low-level readers in Primary



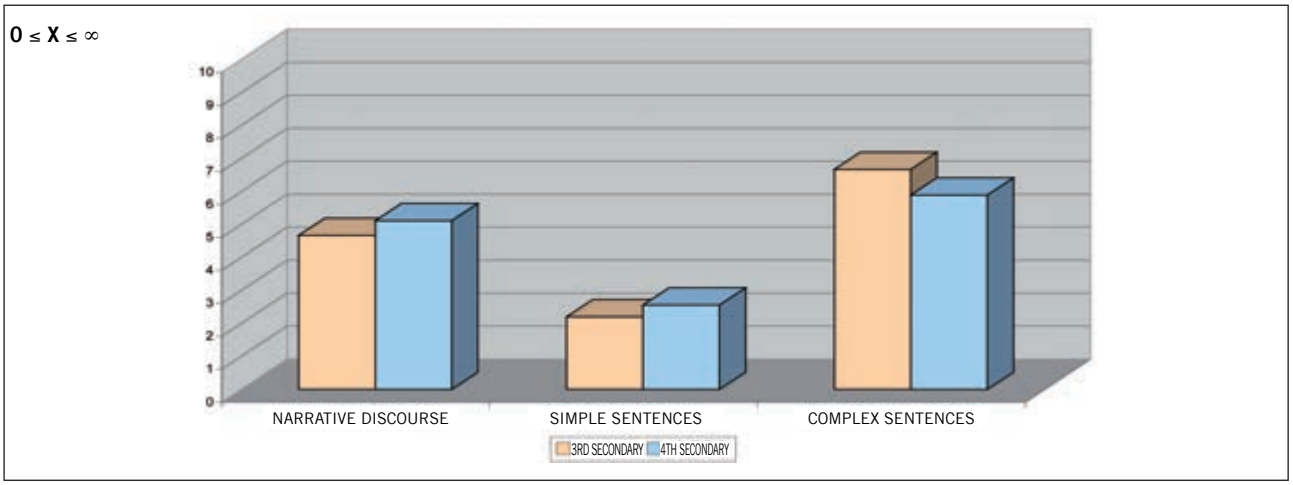
Graph 18. MEAN PICNIC IN SECONDARY
High-level and low-level readers



Graph 19. MEAN PICNIC
High-level readers in Secondary



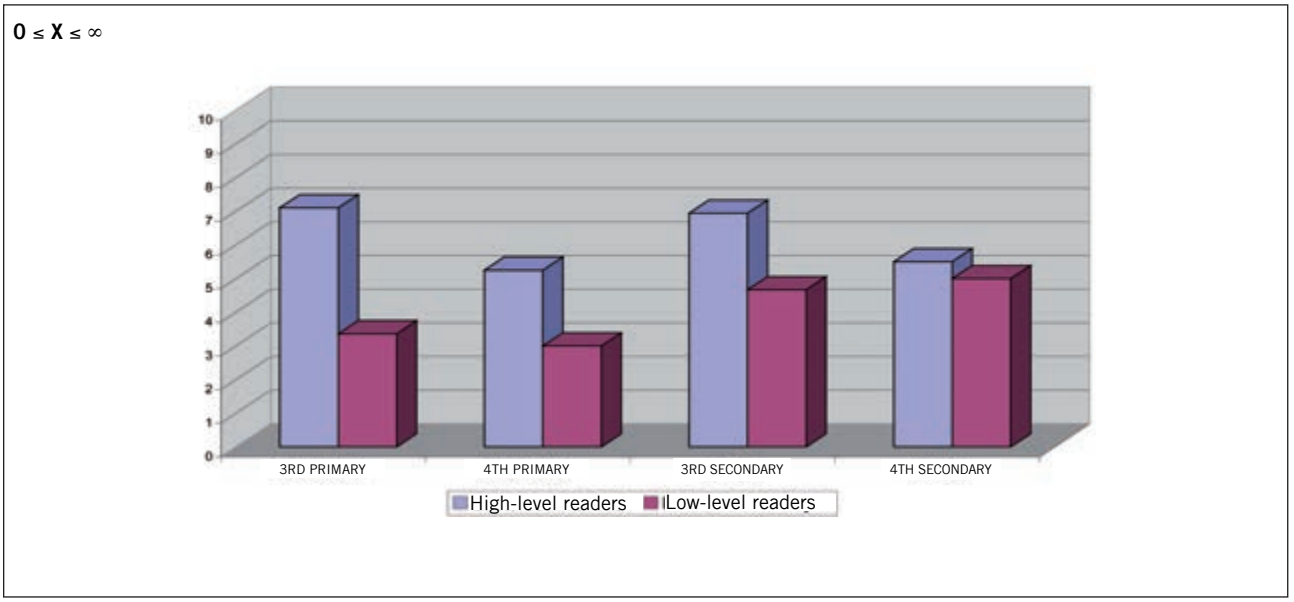
Graph 20. MEAN PICNIC
Low-level readers in Secondary



4.4. WRITTEN ORAL EXPRESSION (CLOWN)

The relationship between written production and reading comprehension is evident in all linguistic dimensions studied, in the results of both Primary and Secondary students.

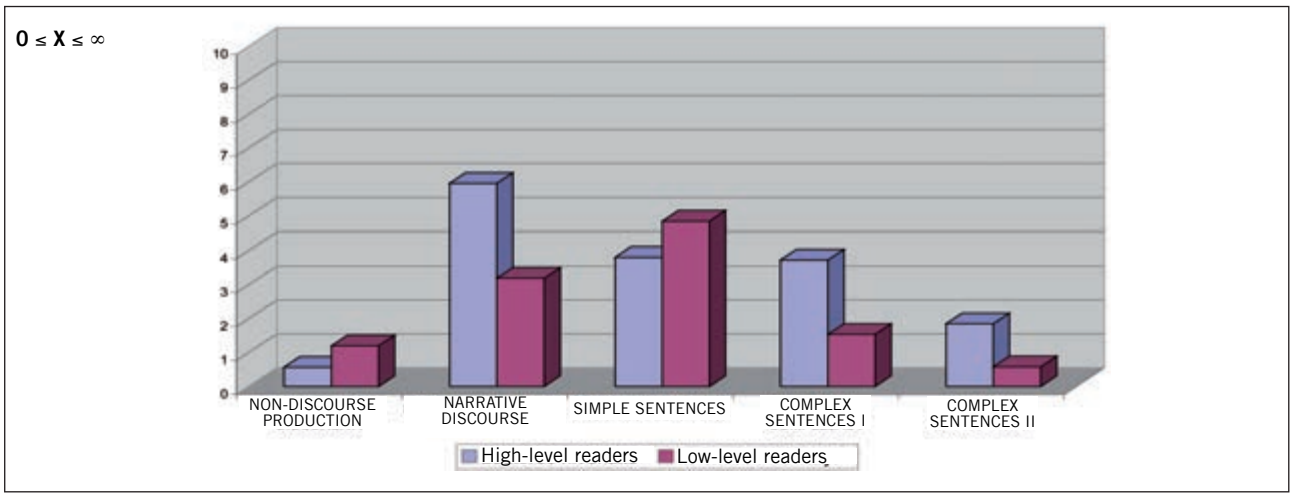
Graph 21. MEAN CLOWN: NARRATIVE DISCOURSE (N=100)
High-level and low-level readers by year



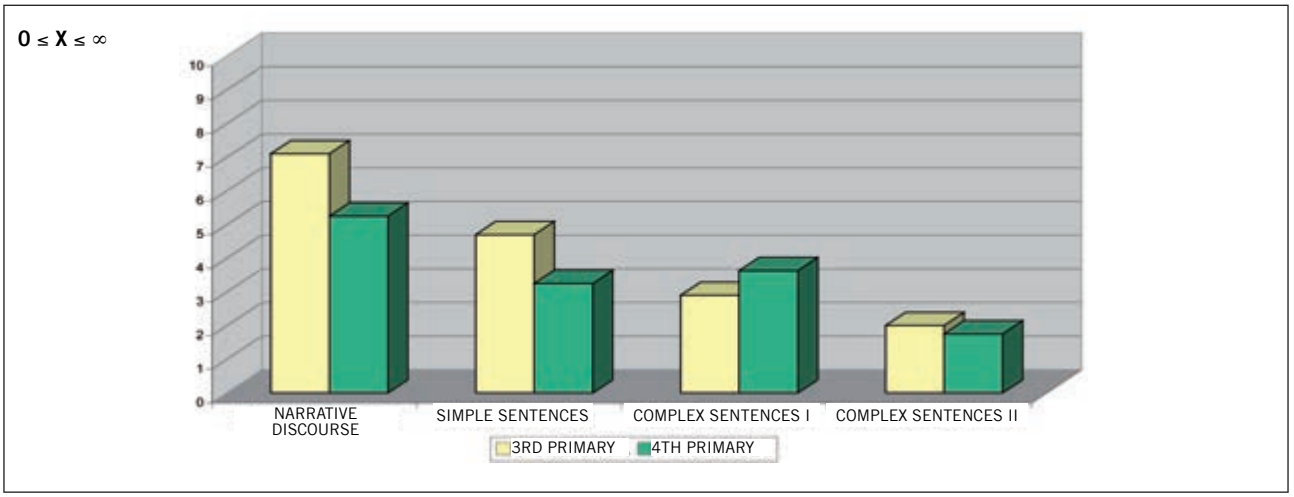
In this regard, a t-test was performed for independent groups, comparing 3rd and 4th year of Primary. Statistically significant **differences were found between higher-level readers vs. lower-level readers**, both in simple sentences [t(48)=9.635 p=0.003], and in complex sentences [t(48)=5.537 p<0.023], in favour of the higher-level group of readers.

In addition, when we conducted the Pearson test among the scores obtained in discourse organisation, complex sentences and simple sentences in PICNIC and CLOWN, we found significant correlations (r=0.514, p=0.000; r= 0.514, p=0.000 and r=0.350, p=0.003, respectively). This **shows the relationship between oral and written competencies.**

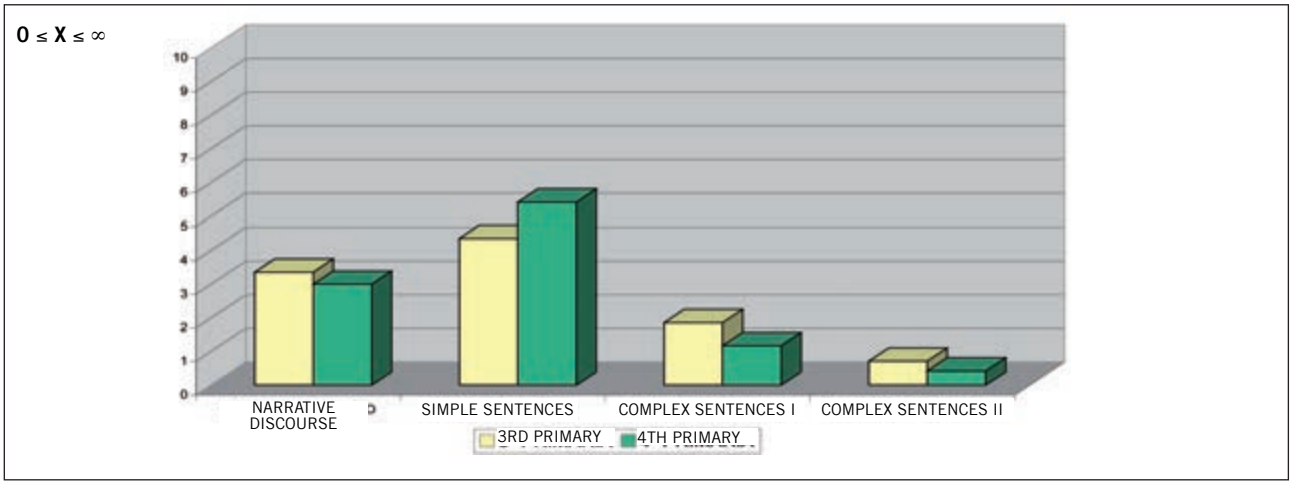
Graph 22. MEAN CLOWN IN PRIMARY
High-level and low-level readers



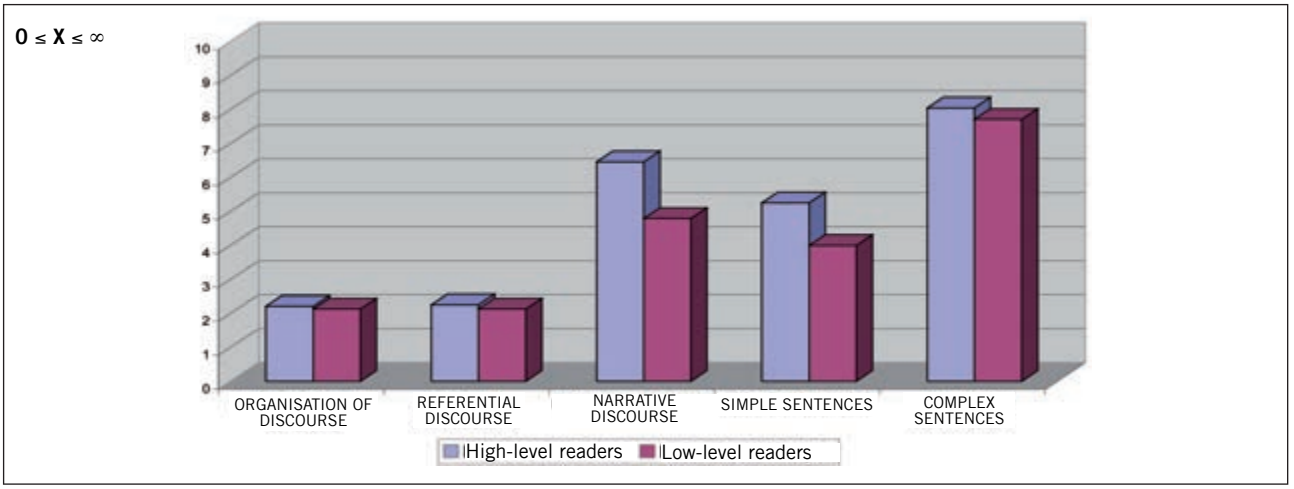
Graph 23. MEAN CLOWN
High-level readers in Primary



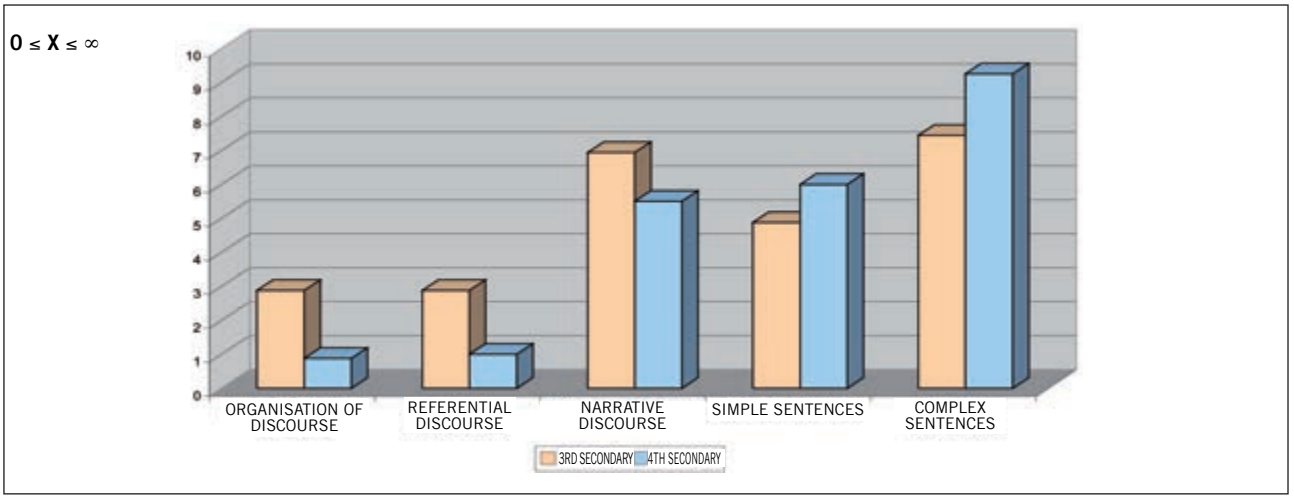
Graph 24. MEAN CLOWN
Low-level readers in Primary



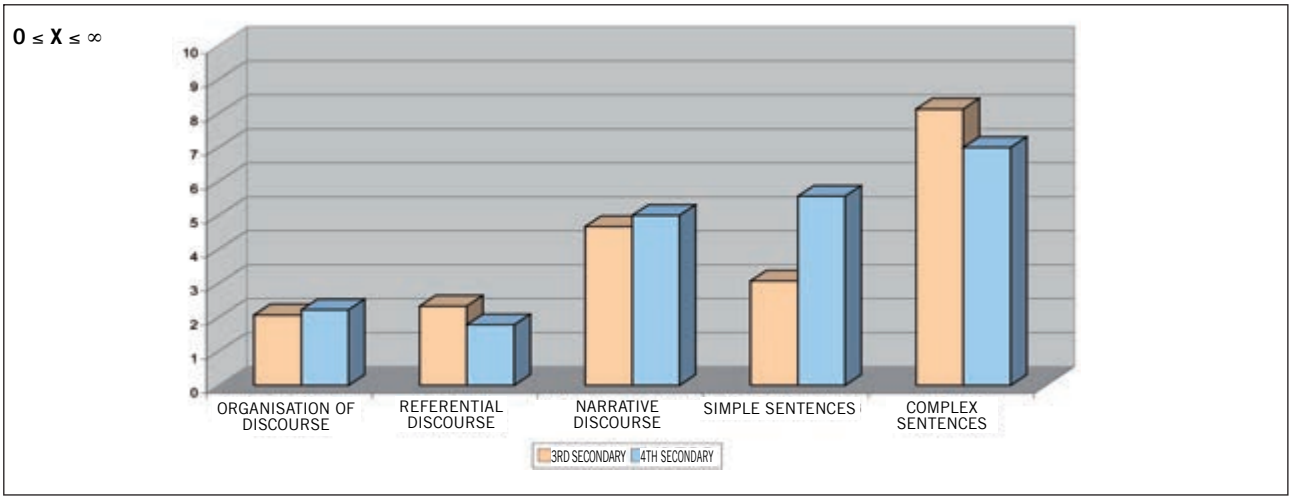
Graph 25. MEAN CLOWN IN SECONDARY
High-level and low-level readers



Graph 26. MEAN CLOWN
High-level readers in Secondary



Graph 27. MEAN CLOWN
Low-level readers in Secondary

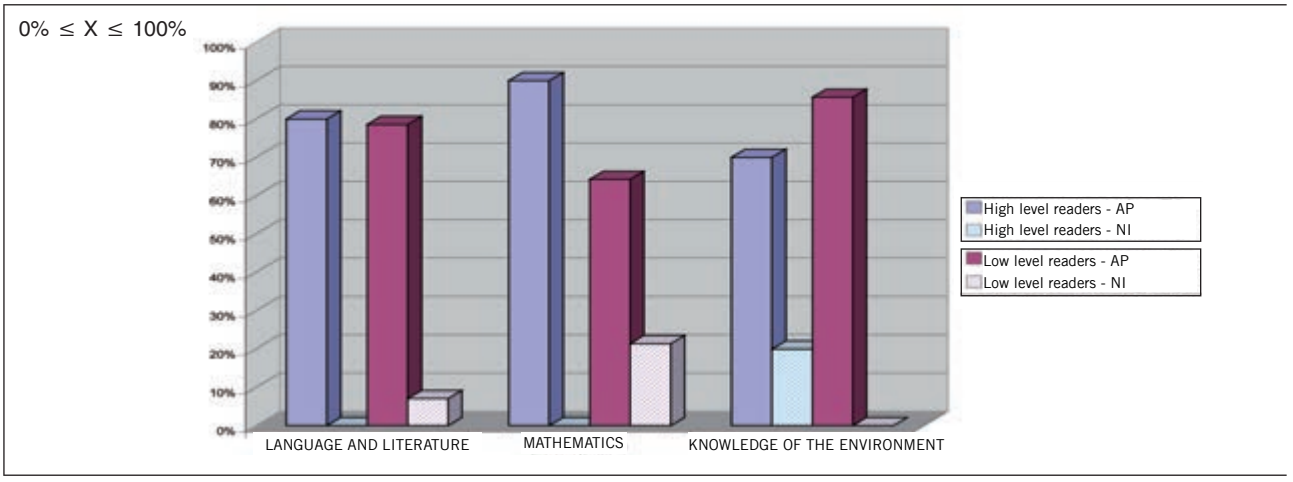


4.5. ACADEMIC PERFORMANCE

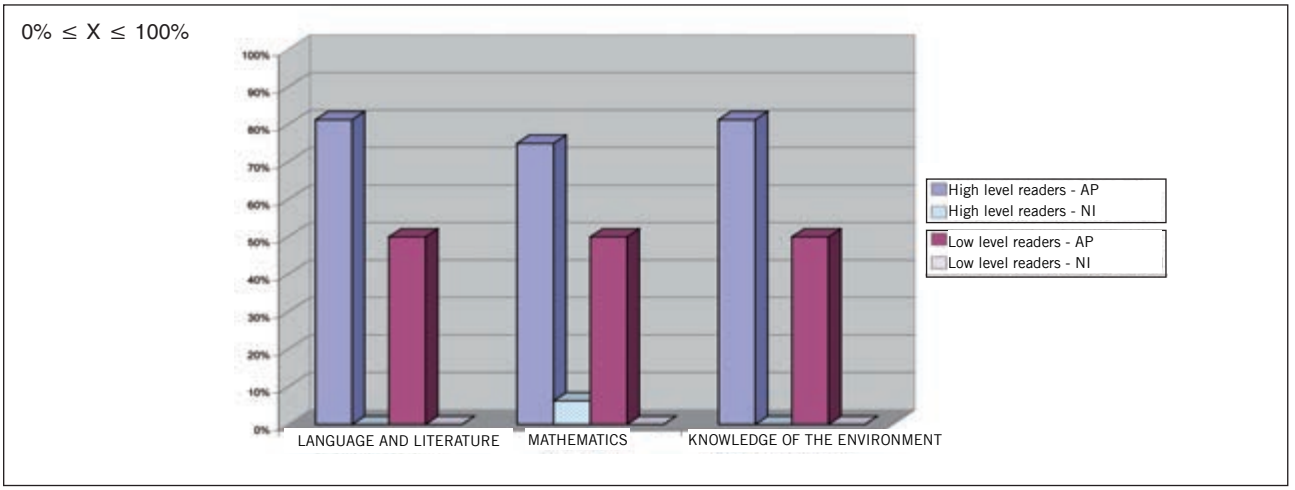
This section is, despite being one of the objectives of the Study, the most difficult to interpret. On the one hand, academic performance in primary education has qualitative ratings (NI=needs improvement, AP=adequate progress). On the other hand, in compulsory secondary education, as there are no year or group means, interpretation can only be performed with the scores of the subjects evaluated, with the standard classification scales on the horizon.

However, a qualitative analysis of the academic performance of students in primary and secondary education shows that it is generally high-level readers who score higher than lower-level readers.

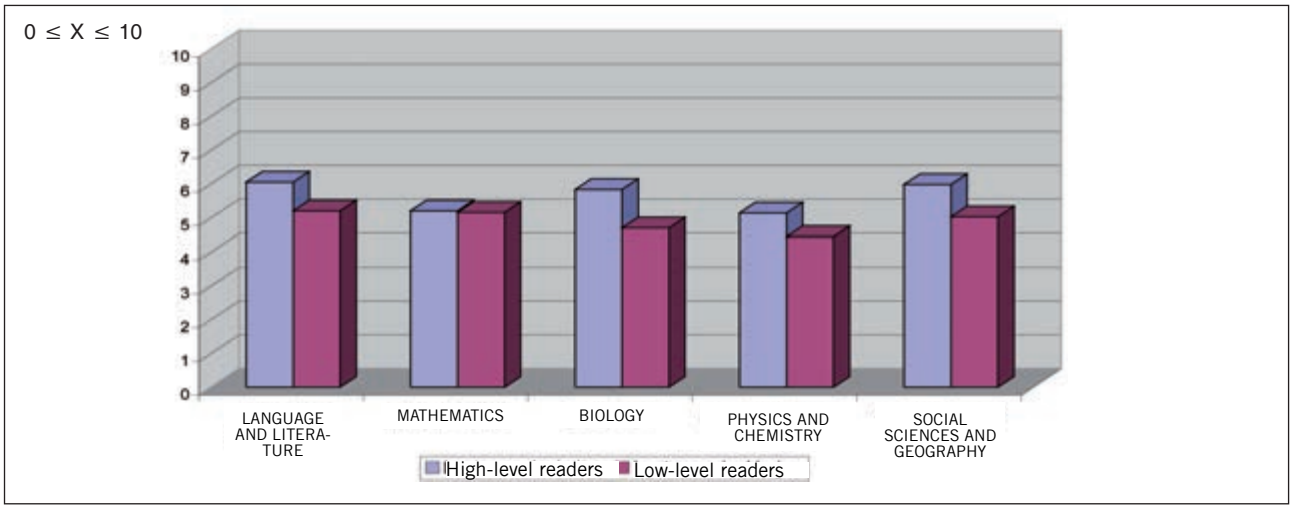
Graph 28. MEAN ACADEMIC PERFORMANCE IN 3RD YEAR OF PRIMARY
High-level and low-level readers



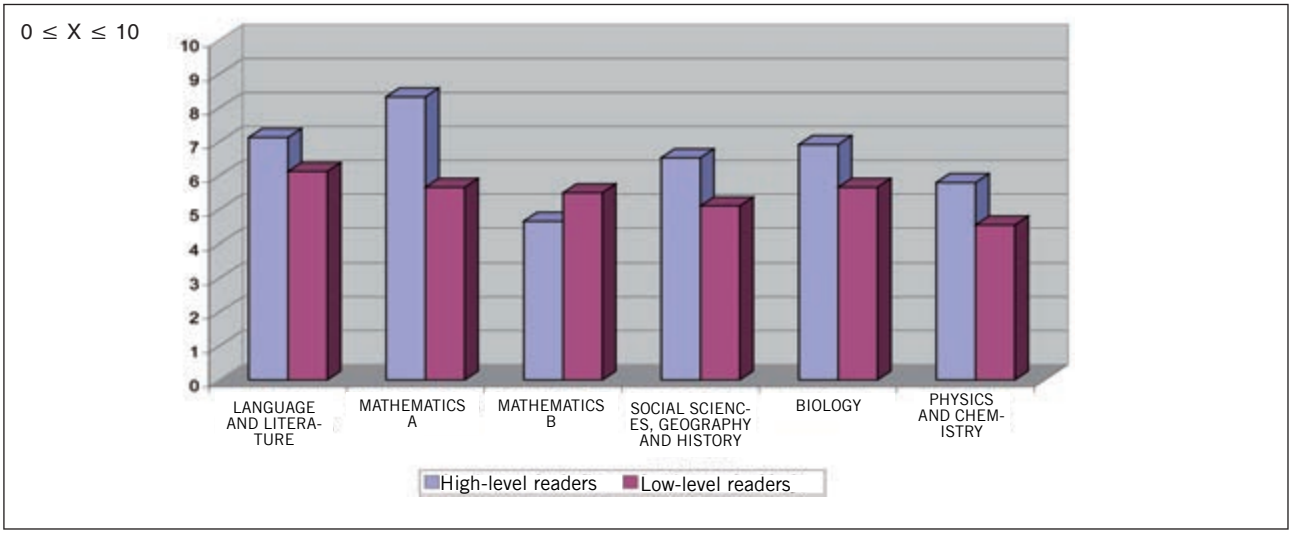
Graph 29. MEAN ACADEMIC PERFORMANCE IN 4TH YEAR OF PRIMARY
High-level and low-level readers



Graph 30. MEAN ACADEMIC PERFORMANCE IN 3RD YEAR OF SECONDARY
High-level and low-level readers



Graph 31. MEAN ACADEMIC PERFORMANCE IN 4TH YEAR OF SECONDARY
High-level and low-level readers



4.6. INFLUENTIAL VARIABLES

To ascertain the influence of reading on other variables, it was compared with that exerted by **school variables**: factors related to the methodology (curricular adaptations, adaptations of the assessment mode), the existence of speech therapists and the conditions under which they were given (weekly hours, number of pupils per speech therapist, etc.), and early care. All these variables (twelve, in total) were grouped into one. For this, they were dichotomized (adequate vs. inadequate), and the variables with a positive score were counted.

This composite score of the school variables was, in turn, dichotomized and interacted with the variable reading comprehension in 2x2 ANOVAs (2 groups in reading comprehension: high-level readers and low-level readers, and 2 groups in the unified school variable: adequate vs. inadequate means). The above variables were taken as dependent variables.

Results in primary education were strong. In all cases **only the reading comprehension variable influenced the variable taken as a dependent.** For example, the ability to organize discourse in the CLOWN test resulted in a significant overall difference [$F(3.48)=6.474$, $p=0.001$, $^2=0.288$]. But this difference was mainly explained by the influence of reading comprehension [$F(1.48)=18.014$, $p=0.000$, $^2=0.273$]. The influence of school variables was much smaller [$F(1.48)=0.625$, $p=0.433$, $^2=0.013$]. In other words, only 1.3% of the variance in the ability to organize discourse was due to school variables, compared with 27.3% for reading comprehension. Similar results were found when other measures of language production and phonological working memory were taken as dependent variables.

Given the explanatory relevance that the data give to reading comprehension, it was essential to identify the factors that led students with hearing impairment to be more or less competent in this skill. For this purpose, all variables related to spoken or written oral language, including support variables (working phonological memory), were subjected to a discriminatory step-by-step analysis, taking as dependent variable the proficiency in reading comprehension, and the others as independent variables. The result showed that it was only **the variables of discourse organisation: spoken** ($p=0.005$), **written** ($p=0.023$) **and morpho-syntactical complexity** ($p=0.010$) **that explained the reading competency of students with hearing impairment.** The resulting discriminatory function showed an eigenvalue of 14.410 (differences between higher-level and lower-level groups of readers divided by differences within groups), which is very high. In addition, this function grouped 75% of the participants: 92.3% of the higher level readers and 57.7% of the lower level readers.

5. Discussion

Before commenting on the results, we need to reflect on two issues that are worthy of clarification.

The first is related to the *intra-group dispersion* bias of the sample. As explained above, this bias was minimised by regrouping the subjects by their results in *reading compression* (PROLEC Test 10 for 3rd and 4th year of Primary PROLEC-SE Test 5 for Secondary). Two groups were configured: one with the higher reading level subjects and another with the lower reading level subjects.

The second clarification concerns the *lack of clear influence of school variables*. This may have been related to how the data on these variables were taken, where perhaps a high degree of subjectivity arose due to a lack of precise and well-executed criteria. The weight of this supposed subjectivity is impossible to quantify, but in any case it is presumed significant.

Once these clarifications have been made, an attempt will be made to identify the variables that influenced subjects manifesting themselves as *high-level readers or low-level readers*. Before embarking on this central topic, though, the results obtained in the different standardised tests will be discussed, following the same order as in the presentation of results, in order to make it easier for the reader to understand this publication.

IQ (TONI-2)

Both groups, readers with a higher level and readers with a lower level, lie within the mean in the TONI-2 non-verbal intelligence test; in addition, the intra-group dispersion is moderate, a typical deviation above and below the mean ($\bar{X}$ =100, Sx=15). Moreover, 83% of the group is located in the right half of the curve, i.e. from 100 onwards.

This is a good starting point, since the differences found between the groups **will have to be attributed to variables other than the cognitive capacity of the subjects.**

It is also important to highlight the **homogeneity of the sample in this intelligence test**, since a characteristic of the deaf population is its internal dispersion in all tasks that depend on learning-related variables, both declarative and incidental. This proves that hearing impairment and intellectual capacity are independent. As a result, **differences in academic and reading performance will depend more on other variables** such as: time of detection and intervention, communicative mode, family engagement, use of prostheses, etc. **and teaching/learning processes, than on the general intelligence of students.**

Therefore, for change to occur it is not only necessary to improve resources and processes within the Education System. One must address the causes. The reading level of the deaf cannot be greatly improved once it is detected that it they do not an appropriate level for their age, at the age when hearing peers have already acquired this ability, which allows them to be independent learners. The solution will depend on the capacity for anticipation, after ascertaining the variables that make a good reader, and deploying the right means in time for them to be present.

Among the differences found are some that are *anecdotal*, perhaps due to sample bias or just at random, and others that are more *structural* and deserve serious reflection. These include the age of diagnosis.

The differences are significant in favour of earlier diagnoses, in twelve-month bands. However, the differences disappear by taking the complete sample and distinguishing between those who were diagnosed early versus late. The differences by age range are easily explained, but it is not well understood why the significant differences disappear when grouped by early versus late detection.

One plausible explanation could distinguish between diagnosis and proper and effective rehabilitation. Diagnosis alone is not the solution. Our sample has an age range of 8-19 years with an average of 12.7 years. This means that many subjects must have been diagnosed between 1993-95 when the universal auditory screening programmes were not yet outlined (Commission for the Early Detection of Child Hearing Loss-Prevention-CODEPEH, 1999; Early Detection of Deafness Programme, approved by the Ministry of Health and Consumption in consensus with the Autonomous Regions, 2003). If this explanation is accepted, i.e. if there was no good early diagnosis followed by adequate intervention, then the sample results in quantitative variables, especially academic performance, reading level and verbal comprehension, are justified and corroborated by the literature (Yoshinaga-Itano, 2003).

Lastly, **IQ coincides with diagnostic age and hearing loss in the task of comprehending texts.** That is, for subjects with above-average IQ versus subjects with below-average IQ, matched in both deafness and diagnostic age groups, subjects with higher IQ will perform better in reading comprehension. Although this may seem obvious, viewed another way it is of great interest. Since when the diagnosis is late, especially in severe and profound deafness, **subjects with mid-high IQ are cognitively blocked, i.e. functionally they perform as subjects with low IQ.**

This is in line with what was suggested by Locke (1997) when he says, presenting his data on the effectiveness of the cochlear implant, that for the measures to take effect they must be applied at the appropriate time, within critical periods; and Spencer (2004) stresses family engagement as a decisive variable.

Phonological awareness (pseudo-word repetition test - RPsP)

This test is of particular interest in the context of this Study because it relates to the perception and production of speech and the cognitive system of working memory. The first aspect detected is that the more syllables, the more difficult it is to repeat the pseudo-words. This could be due to a perception problem or short-term memory (STM) problem.

The **perceptual hypothesis** refers to deficiencies in the quality and reception of input, which is easy to assume in a sample where 57% use conventional prostheses versus 39% who have received a late cochlear implant (CI), since of this 39%, 53% received their CI between 4 and 8 years of age. **The data are strong in favour of the use of auditory prostheses**, both in $RpsP_{frec}$ [F(1.50)=4.184, p=0.046] and in $RpsP_{nofrec}$ [F(1.52)=7.773, p=0.007]. It is nothing new to say that prostheses help to perceive speech better, because that is their function. However, **it is important to emphasise their importance in reading comprehension**, which is particularly sensitive to the mastery of the grammatical lexicon, which without the use of adequate prostheses is very difficult to acquire.

The **processing deficit** hypothesis refers to the working memory, and more specifically to the phono-articulatory loop, given the robust word length effect shown by the subjects, which is greater in $RPsP_{nofrec}$ than in $RPsP_{frec}$.

Moreover, **one measure of STM is articulatory capacity**, accepting that the amplitude of STM is equal to the number of phonological segments that a subject articulates in 1.7 seconds. Taking into account the role of memory in school learning, and knowing that the articulatory speed of the deaf person is generally lower than that a hearing peer, **this helps explain the difference in school performance between deaf and hearing people, with other variables remaining constant**. It is clear that the data obtained in the PRsP test should not lead to decisive conclusions, but it does help somewhat improve our understanding, and even to explain the problems encountered by deaf students in school. Further research will be needed to test these hypotheses.

The higher performance in $RPsP_{frec}$ vs. $RPsP_{nofrec}$ is also explained by the degree of deafness, to which the data associate a robust frequency effect with better results in repeating frequent vs. infrequent syllables. The better performance of hearing (age $\bar{X}$ =7 years) than deaf people (age $\bar{X}$ =12.7 years), despite the significant age difference, is another data point that highlights the disadvantage of deaf compared with hearing students in all aspects that depend on implicit language, as may be seen in the following table.

Contrast deaf vs. hearing people in the pseudo-word test

	PD (0-40) repetition PsP_{frec}		PD (0-40) repetition PsP_{nofrec}	
1 implant	20.54	*Pc*<1	15.70	*Pc*<1
Hearing aid + implant	21.11	*Pc*<1	15.33	*Pc*<1
2 hearing aids	24.74	*Pc*<1	18.77	*Pc*<1
1 hearing aid	31.25	*Pc*<1	24.75	*Pc*<1
2 implants	33.20	*Pc*<1	27.20	*Pc*<1
Hearing (7 years)	36.75	*Pc*=40	32.88	*Pc*=40

In summary, it is confirmed that all deaf subjects have acquired some oral language skills related to basic levels of phonological consciousness. The acquisition of these skills relates to the use of auditory prostheses, to the technical aids available in the classroom, specifically to FM emitters, to the number of speech therapy hours they had in Early Care and Early Childhood Education and to the training of parents in oral communication support systems. In other words, these variables are **good prognostic factors** of the achievable level in implicit language.

However, deaf students 3rd and 4th year of Primary and 3rd and 4th year of Secondary have a lower level of proficiency in skills assessed in the RPsP than hearing students at 1st year of Primary who are still in the initial phase of learning to read.

Comprehension of texts (PROLEC and PROLEC-SE)

The data obtained in test 10 of the PROLEC and test 5 of the PROLEC-SE allowed the group to be divided into two subgroups: one with those who obtained higher scores in reading and another with those who obtained lower scores, with a statistically significant mean difference [F(1.98) 376.137, $p<0.001$], the lowest score in the subgroup of readers with a higher level (X=82.95) being higher than the highest score in the subgroup of readers with a lower level (X=76.96).

This data point is interesting, since it points to a **trend different from that usually found during decades of research** regarding the reading level of deaf students, who were grouped below centile 15, with some rare exceptions (Conrad, 1979; Kyle and Woll, 1985; Paul & Jackson, 1994; Harris and Beech, 1995; Leybaert, 1996; Marschark & Harris, 1996; Lichtenstein, 1998; Asensio, 1989; Alegría, 2004, review; Torres & Santana, 2005).

Many variables must have influenced these results, but **it is very significant that auditory prostheses and technical aids appear once again among the variables that discriminate between those who read better and those who read worse**. Students using FM, in particular, make fewer errors in reading tests than those not using it [F(1.51)= 5.200, p=0.028].

Spoken oral expression (PICNIC)

This test dives deeper into the **variable that most correlates with reading comprehension**, i.e., it gets to the heart of the reading problem of deaf students, which is none other than **competency in the oral language in which they read** (Dickinson and MacCabe, 2001).

In this regard, the aforementioned study of Silvestre & Ramspot (2003;2004) showed significant relationships between oral and written competency.

Theoretically, any language can contribute to the reading process, and moreover, to reach an effective reading level it is essential to have acquired a language, whatever it may be (Goldin-Meadow and Baybery, 2001). However, it must be stressed that knowledge of the oral language in which the text is written is essential.

While the RPsP test listed the **basic mechanisms** for handling learning to read (cf. ut supra), we must now list those **that make it possible to advance reading comprehension**: knowledge of the syntactical and semantic structures of the spoken language in which one reads, appropriate vocabulary in extensive and intensive terms, verbal reasoning skills, in-depth knowledge of the restrictions and conventions of written text.

In addition, in order to access textual organisation, we must master the recursive elements that maintain textual cohesion (change of verb tense according to textual order in narrative discourses, use of anaphora, synonyms, pronouns, change from indefinite article to definite, etc.) that are characteristic of the textual typology of each oral language.

Bearing in mind that narrative discourse covers both aspects of discourse organisation and referential organisation, it should be noted that, as the results obtained demonstrate, one of the most important difficulties of deaf students in comprehending texts is the mastery of the verbal marks that allow the referent to be maintained in discourse.

This would perhaps explain why the differences between 3rd and 4th year of Primary found in the results of narrative discourse, both in high-level and low-level readers, are smaller than the differences found in the results in the sentence structure field, between both levels.

Written oral expression (CLOWN)

This is the critical test par excellence for **assessing knowledge of written oral language**. In sitting down to write, most of us are apprentices of our own language. In the cognitive task of putting speech into written form, we are left alone with our level of proficiency in oral language. **Writing will manifest all weaknesses in the formal aspects of oral language** (phonology, morphology and syntax), but will also highlight **shortcomings in content** (wealth of vocabulary, knowledge of the world, etc.), **more cognitive aspects** such as mental representation (mental patterns and models), verbal reasoning, logical reasoning, etc.

In understanding both oral and written texts, the lack of command of many of these linguistic elements makes this task difficult (Silvestre & Laborda, 2006).

The results obtained in the written production test (CLOWN) show that Primary students use a greater number of simple sentences than complex sentences, which corresponds to the process of developing standardised language, since at this age one learns to write, short-term memory is consolidated and the automation of phonology is not yet fully established.

However, in this test, Secondary students, as in the oral production test (PICNIC), show failings in the organisation of discourse and referential discourse. These shortcomings contrast with the abundant use of narrative discourse and complex sentences. Consequently, if we judge that this situation persists, the low inferential capacity will make it difficult for them to go beyond narrative texts and they will fail in the tasks that are carried out on the basis of understanding complex texts.

School performance and reading comprehension (high and low-level readers)

The narrative discourse in PICNIC and CLOWN and the complex sentences II of CLOWN explain 97.9% of the variance between the group that reads better and the group that reads worse. In other words, **speaking well, organising the speech, having some syntactic complexity, is the "cause" of whether a text is well understood or not. And it is precisely this understanding that is responsible for school performance.**

In order to understand and explain the educational situation of students with hearing impairment, the level of reading comprehension associated with the other measures (spoken and written oral language, psycholinguistic support skills, such as phonological working memory, etc.) had to be analysed; and the variables significantly influencing reading comprehension had to be known. Knowledge of both could lead to conclusions aimed at improving teaching/learning conditions for hearing-impaired students.

Among the conditions that are necessary, although not sufficient, to improve school performance, reading comprehension bears the greatest responsibility. And what would seem to explain why a hearing-impaired student is a good reader and has a good understanding of what they read is their ability to produce oral language.

6. Conclusion

PROPOSAL FOR OPERATIONAL MEASURES

1. There is **a group of deaf students who have reached a mean reading level comparable to that of their hearing peers** and who, as a group, deviate from the tendency to reveal the very low levels of reading comprehension that has traditionally characterised such students.

   This is a major discovery. Comparing this sample with data from previous studies up to less than a decade ago, a significant increase in the reading level is detected and confirmed.

2. **The level of (spoken and written) oral language** acquired by these deaf students **is responsible for good reading comprehension.** Understanding texts appropriate to each level is an **unavoidable basis for good school performance.** A wide body of research supports this relationship which is clearly seen here.

   Traditionally, academic performance has been linked to the IQ of students. However, the data of this Study show that this study does not depend directly on IQ, since all students in this sample (high-level and low-level readers) reach a medium-high level in the intelligence test.

   However, differences attributable to other variables are detected.

   Oral language competency, as an essential requirement for effective reading, is therefore found to be a decisive variable in accessing the academic curriculum. Furthermore, the **appropriate combination of variables** such as: early diagnosis, auditory prostheses (digital hearing aids and cochlear implant), technical aids (frequency modulated (FM) emitters), early care and the start of the speech therapy intervention addressing the basis of cognitive processes, perception and memory are seen as an important influence on the acquisition and development of this linguistic competency.

3. **The Spanish educational regulatory framework indicates**, among the pedagogical principles governing the structuring of teaching, **reading comprehension and oral and written expression as basic elements for access to the curriculum.**

Schools also know this and so one of their priority objectives, to which they dedicate several years, is to teach their students to read. This goal, which students reach at the end of Primary education, in pre-adolescence makes them independent learners, enabling them to successfully cope with compulsory secondary education.

4. **Teaching** students with deafness **to speak is the starting point** for embarking on their time at school on equal terms with their hearing peers.

   This has a simple explanation: hearing students begin learning to read with a profound knowledge of the language they are reading, while deaf students rely on reading to continue learning the oral language.

   The task of the school must be directed towards the teaching of oral language without, of course, ruling out any augmentative means that facilitate communication, always through an assessment of the individual case and decision-making tailored to personal needs and circumstances.

5. It would be appropriate **to produce** a *white paper* that includes **well-defined proposals** as to the educational pathway of students with deafness, **based on research data** and that, **rigorously applied and evaluated**, serve to achieve the maximum potential development of students with deafness, from the moment this is detected.

   Given the existing dispersion of methodologies or approaches to address the school education of students with deafness, we must **carry out a serious analysis and assessment for the provision and allocation of resources and the application of the different communication systems, since not all of them serve the same purpose**, as shown by the data contained so far in the literature and scientific experience.

   The definition of these strategic lines should take into account the findings provided by this Study as to the need for oral language, the importance of early care, early use of hearing aids, appropriate classroom equipment, student/speech therapist ratio, etc.

6. **Deepening our knowledge of the cognitive and psycholinguistic processes** at the core of oral language acquisition **is the ideal and effective way to improve the reading level of deaf students.**

   For this reason, **teacher training must focus on updating skills** so as to manage all the resources available today that allow them to go beyond the accessibility of communication and information, eliminating the deeper communication barriers that have to do with access to language, knowledge, autonomous learning and the search for and deepening of information to develop their own knowledge and ideas.

IN SHORT, the **critical issue in the education of hearing-impaired students** is access to spoken language not only because of communicative needs, but also because of the important role it plays in the development of more complex cognitive processes, such as learning to read and write.

This means, in the field of teacher training and in the school environment itself, generating the **necessary evolution of competencies, attitudes, methodologies and instruments** required today by new deaf students. It raises new educational needs to be met with the current resources available to ensure their personal development, learning and inclusion in the standard social environment.

To achieve this objective, among others, consideration must be given to **particularly limiting conditions** such as **arriving too late**, hence the importance of education in the early years, **and not arriving properly**, hence the **need for the necessary and sufficient resources and qualified support.**

If today's deaf children and young people are to become independent adults tomorrow, we must not forget that school performance shapes their subsequent choices of training and access to employment, which will be decisive in achieving their autonomy, social integration, improving their quality of life and achieving their fullest personal development.

7. Glossary of Terms

ANOVA: statistical procedure for basically comparing means. The behaviour of a dependent variable or response (*quantitative variable*) based on one or more independent or predictive variables (*qualitative variables*) is explained with ANOVAS. It also allows one to control the effect of extraneous variables (*non-experiment variables*) by introducing them as covariates.

INCIDENTAL LEARNING: learning that is performed without the subject being aware of the stimuli received and processed.

INTENTIONAL LEARNING: learning that is performed consciously and where the subject plays their part in learning or solving a task.

RESIDUAL HEARING: hearing that is preserved due to the presence of active ciliary cells in the apex or inner part of the cochlea. Auditory remnants are thus maintained which, being sensitive to low frequencies, fulfil a linguistic (rhythm, prosody intonation, intensity, duration and pause) and vital mission (deep sounds are associated with greater dangers).

PHONO-ARTICULATORY LOOP (PAL): working memory (WM) mechanism responsible for briefly retaining and processing verbal stimuli. It consists of a phonological loop (responsible for the effects of "rhyme" and "misunderstood speech") and an articulatory loop (responsible for the effects of "word length" and "articulatory suppression"). The amplitude or capacity of the loop depends on the implicit knowledge of phonology and articulatory speed.

EXTREME CASES: in data analysis, subjects that deviate from the mean by several standard deviations, which could thus alter the overall group results.

COGNITION: cognition, intelligence, and thinking are generally comparable terms in reference to mental functions.

PHONOLOGICAL AWARENESS: implicit/explicit knowledge that words are "formed by" or are "decomposable into" smaller discrete segments of speech, called syllables and phonemes. Syllabic awareness is automatically discovered, as opposed to phonics that requires formal teaching.

CORRELATION: relationship, degree of similarity or joint variation existing in two or more variables without one of them being the cause of the other. Correlation does not imply causation.

COVARIANCE (ANALYSIS OF COVARIANCE): statistical procedure that attempts to control extraneous variables.

DECODING: process by which, when faced with a written word, a speech sound is associated with each graphic form that, through the synthesis or joining process, will allow it to be articulated and recognised, or allow access to the meaning stored in long-term memory.

CHRONOLOGICAL AGE: the age measured in years and months of a subject since birth.

READING AGE: the level reached in reading skills, which may be as expected for chronological age or different.

MENTAL AGE: state of intelligence corresponding on average to a given age. It is obtained using standardised tests.

EFFECT(S): intergroup differences in the performance of a task due to material modalities or characteristics, e.g. effects of primacy/recency, ceiling/floor effects, rhyme effect, etc.

STATISTICAL: numerical value describing a sample characteristic. It is not a constant value, but a variable that usually changes from one sample to another, e.g., mean, percentile, standard deviation, etc. Statistical analysis detects whether there are significant differences between groups or samples, or between these and the reference population.

PHONOLOGY: level of language that, together with morphosyntax, refers to the form of language. It involves the study of the functional value of sounds in languages, i.e. phonemes and the formation of more complex units, as well as the supra-segmental aspects of languages.

INPUT: inward stimuli. Related to output or outward stimuli.

MORPHOSYNTAX: level of language that, together with phonology, refers to the form of language. It involves the study of forms, flexion and derivation, as well as the rules of combination that govern the formation of syntagms and sentences.

SAMPLE-POPULATION: the sample is part of a population. Assessing a whole population or set of individuals belonging to a category is often impossible, hence a part of the population or sample is used.

TERMINAL READER LEVEL: in the educational context refers to the reader level reached at the end of compulsory education. It also refers to the reader level reached by an adult subject.

CRITICAL PERIOD: this is a limited time period for acquisition of specific skills. During the first three years of life, then, phonology is acquired naturally for subsequent automatic use. It is then more difficult to acquire and will be less automatic.

PRAGMATIC: level of language referring to use. It involves the study of the different functions and uses of language.

PRE-LINGUAL: subject with deafness present from birth or acquired before having reached a stable oral language level. A subject who acquires deafness after reaching a stable linguistic level will be referred to as a post-lingual.

ALPHABETICAL PRINCIPLE: knowledge that each speech sound is represented by a graphic form, as well as that each graphic form or group of such forms corresponds to a speech sound. The alphabetical principle is directly related to phonetic consciousness, which is acquired when learning to decode graphic forms. This relationship between sounds and graphs, when it is one-to-one, that is, when each sound is always represented with the same letter and each letter always sounds the same way, gives rise to transparent spelling languages, such as Spanish.

STANDARDISED TESTS: validated measuring instruments, usually with large samples. They are used to measure cognitive and linguistic aspects of isolated subjects or groups. They are usually presented with scales for different ages, different school levels, etc.

NON-PARAMETRIC TESTS: statistical procedures that do not hypothesise parameters or require quantitative data, since they focus on nominal or ordinal properties of the data. No assumptions are made about the original populations from which the samples are drawn.

PSEUDO-WORDS: sequences of meaningless phonemes ordered following the laws of phonotactics, i.e., the form is correct, they could be words, but they are not because they have no meaning, e.g., batle vs. table, pencil vs. cilpen.

SEMANTICS: level of language referring to its content. It involves studying the organisation of linguistic meanings.

BIAS: variable or characteristic of a group, which does not occur in the other groups with which it is compared and which may therefore devalue the data compared.

INTRA-GROUP VARIABILITY: differences found when comparing subjects with others within the same group.

INTER-GROUP VARIABILITY: differences found when comparing groups of subjects to each other.

DEPENDENT VARIABLE (DV): quantitative variables. These are the subject's responses, measured using interval or ratio scales. It is the values generated by the different subjects that allows comparison of groups.

INDEPENDENT VARIABLE (IV): these are categorical variables (nominal or ordinal). The *factor* variable is the categorical variable defining the groups to be compared, e.g. male/female, high/low reading level, Primary/Secondary, etc.

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9. Annexes

Annex 1

DESCRIPTION OF THE FINAL SAMPLE SELECTED (TABLES)

- **Territorial distribution**

- **Sociodemographic and personal variables. Basic Profile**

TERRITORIAL DISTRIBUTION (N=100)
TABLE 1

AUTONOMOUS REGION		PRIMARY EDUCATION	SECONDARY EDUCATION
ANDALUSIA	19	8	11
ARAGON	5	2	3
ASTURIAS	2	1	1
BALEARICS	3	3	0
CASTILE - LA MANCHA	14	9	5
CASTILE-LEON	5	5	0
CATALONIA	7	3	4
EXTREMADURA	5	1	4
GALICIA	5	0	5
MADRID	8	5	3
MURCIA	10	5	5
NAVARRE	5	4	1
VALENCIA	12	6	6

SOCIO-DEMOGRAPHIC AND PERSONAL VARIABLES
BASIC PROFILE (N=100)

DEGREE OF HEARING LOSS

	Frequency	Percentage	Percentage valid	Percentage cumulative
moderate deafness	24	24.0	24.0	24.0
severe deafness	38	38.0	38.0	62.0
profound deafness	38	38.0	38.0	100.0
Total	100	100.0	100.0	

76% of subjects participating in this Study have severe and profound hearing loss.

CURRENT PROSTHESIS

	Frequency	Percentage	Percentage valid	Percentage cumulative
not used	4	4.0	4.0	4.0
1 hearing aid	8	8.0	8.0	12.0
2 hearing aids	49	49.0	49.0	61.0
1 implant	25	25.0	25.0	86.0
2 implants	2	2.0	2.0	88.0
hearing aid + implant	12	12.0	12.0	100.0
Total	100	100.0	100.0	

96% of subjects participating in this Study use hearing aids. 57% use hearing aids and 39% use cochlear implants.

COMMUNICATION SYSTEM

	Frequency	Percentage	Percentage valid	Percentage cumulative
oral	84	84.0	84.0	84.0
oral with acs	2	2.0	2.0	86.0
sl	4	4.0	4.0	90.0
oral and sl	10	10.0	10.0	100.0
Total	100	100.0	100.0	

96% of subjects participating in this Study use oral language to communicate.

AGE OF DIAGNOSIS

	Frequency	Percentage	Percentage valid	Percentage cumulative
0-12	36	36.0	36.0	36.0
13-24	32	32.0	32.0	68.0
25-36	19	19.0	19.0	87.0
37-54	10	10.0	10.0	97.0
55-144	3	3.0	3.0	100.0
Total	100	100.0	100.0	

68% of the subjects participating in this Study were diagnosed before the age of two years, of whom 36% were diagnosed before the first year of life.

AGE OF INTERVENTION

	Frequency	Percentage	Percentage valid	Percentage cumulative
0-1 year	18	18.0	18.4	
1-2 years	24	24.0	24.5	
2-3 years	28	28.0	28.6	
3+ years	28	28.0	28.6	
Total	98	98.0	100.0	
System	2	2.0		
	100	100.0		

42.9% of subjects participating in this Study started treatment before the age of two years.

RECEIVED EARLY CARE

	Frequency	Percentage	Percentage valid	Percentage cumulative
no	29	29.0	29.0	29.0
more than 1 year	53	53.0	53.0	82.0
less than 1 year	18	18.0	18.0	100.0
Total	100	100.0	100.0	

71% of subjects participating in this Study received early care.

TECHNICAL AIDS (2005-2006 SCHOOL YEAR)

	Frequency	Percentage	Percentage valid	Percentage cumulative
FM	49	49.0	51.6	51.6
other	14	14.0	14.7	66.3
Not used	32	32.0	33.7	100.0
Total	95	95.0	100.0	
System	5	5.0		
	100	100.0		

66.3% of subjects participating in this Study used technical aids at school (2005-2006). 51.6% of cases involve Frequency Modulated (FM) equipment.

HUMAN RESOURCES: SPEECH THERAPIST (2005-2006 SCHOOL YEAR)

	Frequency	Percentage	Percentage valid	Percentage cumulative
no	15	15.0	15.3	15.3
yes	83	83.0	84.7	100.0
Total	98	98.0	100.0	
System	2	2.0		
	100	100.0		

84.7% of subjects participating in this Study received speech therapy support at school (2005-2006).

HUMAN RESOURCES: SUPPORT TEACHER (2005-2006 SCHOOL YEAR)

	Frequency	Percentage	Percentage valid	Percentage cumulative
no	40	40.0	40.8	40.8
yes	58	58.0	59.2	100.0
Total	98	98.0	100.0	
System	2	2.0		
	100	100.0		

59.2% of subjects participating in this Study had a school support teacher (2005-2006).

Annex 2

Material prepared for data collection

FIAPAS
CONFEDERACIÓN ESPAÑOLA DE FAMILIAS DE PERSONAS SORDAS

Collaboration Agreement (MEC-FIAPAS)

STUDY ON CURRENT EDUCATIONAL STATUS OF HEARING-IMPAIRED STUDENTS

Data Collection Questionnaire
SAMPLE OF YEAR _____ STUDENTS IN SCHOOL YEAR 2005/2006

1. STUDENT IDENTIFICATION DATA

Surname(s): _____ Name _____ Code: _____

Address _____ Postcode _____ Town _____

Province _____ Tel.: Mobile: _____ Landline: _____

School Name: _____

Address _____ Postcode _____ Town: _____

Province _____ Tel.: _____ e-mail: _____

Item	*Code*	*Description*	*Key*
1	☐☐☐☐	Date of birth	Month, e.g.: 06. Year, e.g.: 92 (last two figures)
2	☐ ☐☐	Gender and age	M=Male; F=Female, e.g.: M 15
3	☐	Gap with normative age	0, 1, 2, 3...

2. DETAILS OF PERSONAL AND FAMILY HISTORY

2.1. About deafness

4	☐	Classification of deafness	1=Pre-lingual (up to 3 years); 2= Post-lingual (+3)
5	☐☐	Age of diagnosis (age in months)	
6	☐	Deafness type	1=Neurosensory; 2=Transmission; 3=Mixed
7	☐☐☐	Loss in better ear (dB)	Mean fr. 250, 500, 1000 and 2000Hz (BIAP)
8	☐☐☐☐	Rehabilitation start date	Month, e.g.: 06. Year, e.g.: 9 (last two figures)
9	☐☐	Months between diagnosis and start of rehab.	
10	☐	Associated deficiencies	1= Yes (detail in comments); 2=No
11	☐☐☐☐	Family history of deafness	0=No; 1=Father; 2=Mother; 3=Siblings; 4=Grandparents; 5=Other

2.2. About the home communication system

12	☐	Home communication system	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
13	☐	Oral communication supports used	0=None; 1=Bimodal; 2=Cued Speech; 3=Both

2.3. About prosthetic equipment

3.2.1. Type and number of prostheses

14	☐	Prosthesis	0=Not used; 1=1 hearing aid; 2=2 hearing aids; 3=1 implant (CI); 4=2 implants (CI); 5=Hearing aid+implant (CI)

2.3.2. Hearing aids

15	Age of adaptation	[ ][ ][ ][ ]	Years months (of the child), e.g.: 2 07
16	Current type of prosthesis	[ ]	0=Not used; 1=Analogue; 2=Digital
17	Current use of prosthesis	[ ]	0=Not used; 1=Total daily; 2=Partial daily; 3=Occasional

2.3.3 Cochlear Implant

18	Age of CI adaptation	[ ][ ][ ][ ]	Years months (of the child), e.g.: 1 08
19	Daily usage time	[ ]	1= Total; 2= Partial
20	Post-implant rehabilitation	[ ]	1= Yes; 2= No

2.4. Early Care (EC): parent information and education

21	Received early care (EC) between 0-3 years	[ ]	0=No; 1=More than 1 year; 2=Less than 1 year
22	Age of start of EC	[ ][ ][ ][ ]	Years months (of the child), e.g.: 1 / 08
23	Rehabilitation centre	[ ]	1=Private; 2=Public
24	No. hours/weeks of EC received	[ ][ ]	
25	EC communication mode	[ ]	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
26	Support for oral communication in EC	[ ]	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
27	Parent training in communication mode	[ ]	1=Yes; 2=No
28	Degree of Satisfaction with EC stage	[ ]	1=None; 2=Low; 3=Medium; 4=High

3. INITIAL SCHOOLING DATA (3 years and above)

3.1. Infant education (3-6 years)

29	Initial schooling age	[ ][ ][ ][ ]	Years months (of the student), e.g.: 3 / 10
30	No. of years spent in Infant education	[ ]	
31	Changed of schools during Infant education	[ ]	1=Yes (detail in comments), 2=No
32	Special School specifically for hearing-impaired	[ ]	1=Yes; 2=No
33	No. of deaf pupils in school	[ ][ ][ ]	
34	Hearing-impaired integration school	[ ]	1=Yes; 2=No
35	No. of integrated deaf students	[ ]	1=1; 2=2-3; 3=4-6; 4= > 6
36	Experience of hearing-impaired integration	[ ]	1=First year; 2=2-5 years; 3=6 years or more
37	Communicative mode in the classroom	[ ]	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL

38		Support for oral communication used	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
39		Family engagement during Infant education	1=None; 2=Low; 3=Medium; 4=High
40		Speech therapist/family coordination	1=None; 2=Low; 3=Medium; 4=High
41		No. of hr/week of speech therapy support at school	
42		Speech therapist coordination with school	1=None; 2=Low; 3=Medium; 4=High
43		No. pupils/speech therapist at school	1=1; 2=2-3; 3=4-7; 4= 7+
44		Speech therapist changes during the stage	1=1 informed professional; 2=1 uninf. prof.; 3=2 changes
45		No. hr/w of curriculum support (educ. therapist)	
46		School speech therapist communication mode	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
47		Support for communication in speech therapy	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
48		Degree of satisfaction with Infant education	1=None; 2=Low; 3=Medium; 4=High
49		After-school speech therapy	1=Private; 2=Public
50		No. of hrs/week after-school speech therapy	
51		After-school speech therapy communic. mode.	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
52		Support for communic. in after-school speech therapy	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
53		Speech therapist/school coordination	1=None; 2=Low; 3=Medium; 4=High

3.2. Primary Education (6-12 years)

54		Initial schooling age at this stage	Years months (of the student), e.g.: 3 / 10
55		No. of years spent in Primary	
56		Changed of school during Primary Special	1=Yes (detail in comments), 2=No
57		School specialising in hearing impairment	1=Yes; 2=No
58		No. of deaf pupils in school	
59		Hearing-impaired integration school	1=Yes; 2=No
60		No. of integrated deaf students	1=1; 2=2-3; 3=4-6; 4= > 6
61		Experience of hearing-impaired integration	1=First year; 2=2-5 years; 3=6 years or more
62		Communicative mode in the classroom	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
63		Support for oral communication used	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
64		Family engagement during the Primary	1=None; 2=Low; 3=Medium; 4=High
65		Speech therapist/family coordination	1=None; 2=Low; 3=Medium; 4=High

66		No. of hr/week of speech therapy support at school	
67		Speech therapist coordination with school	1=None; 2=Low; 3=Medium; 4=High
68		No. of students/speech therapist at school	1=1; 2=2-3; 3=4-7; 4= 7+
69		Speech therapist changes during the stage	1=1 informed professional; 2=1 uninf. prof.; 3=2 changes
70		No. hr/week of curriculum support (educ. therapist)	
71		School speech therapist communication mode	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
72		Support for communication in speech therapy	0=None; 1=Bimodal; 2=Cued speech; 3=both
73		Degree of satisfaction with Primary	1=None; 2=Low; 3=Medium; 4=High
74		After-school speech therapy	1=Private; 2=Public
75		No. of hours/week after-school speech therapy	
76		After-school speech therapy communication mode.	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
77		After-school speech therapy support	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
78		Speech therapist/School coordination.	1=None; 2=Low; 3=Medium; 4=High

3.3. Compulsory Secondary Education (Secondary) (12-16 years)

79		Initial schooling age at this stage	Years months (of the student), e.g.: 3 10
80		No. of years spent in Secondary	
81		Change of school during Secondary	1=Yes (detail in comments), 2=No
82		Special School specialising in hearing impairment	1=Yes; 2=No
83		No. of deaf pupils in school	
84		Hearing-impaired integration school	1=Yes; 2=No
85		No. of integrated deaf students	1=1; 2=2-3; 3=4-6; 4= > 6
86		Experience of hearing-impaired integration	1=First year; 2=2-5 years; 3=6 years or more
87		Communicative mode in the classroom	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
88		Oral communication supports used	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
89		Family engagement during Secondary	1=None; 2=Low; 3=Medium; 4=High
90		Speech therapist/family coordination	1=None; 2=Low; 3=Medium; 4=High
91		No. hrs/week of speech therapy support at school	
92		Speech therapist/School coordination.	1=None; 2=Low; 3=Medium; 4=High

93		No. pupils/speech therapist at school	1=1; 2=2-3; 3=4-7; 4= 7+
94		Speech therapist changes during the stage	1=1 informed professional; 2=1 uninf. prof.; 3=2 changes
95		No. hr/week of curriculum support (educ. therapist)	
96		No. hours/week of interpreter	
97		School speech therapist communication mode	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
98		Support for communication in speech therapy	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
99		Degree of satisfaction with Secondary	1=None; 2=Low; 3=Medium; 4=High
100		After-school speech therapy	1=Private; 2=Public
101		No. of hours/week after-school speech therapy	
102		After-school speech therapy communication mode.	1=Oral; 2=Oral with ACS; 3=SL; 4=Oral and SL
103		After-school speech therapy support	0=None; 1=Bimodal; 2=Cued Speech; 3=Both
104		Speech Therapist/School coordination	1=None; 2=Low; 3=Medium; 4=High

4. SCHOOL CHARACTERISTICS FOR 2005/2006 ACADEMIC YEAR

105		105 School specialising in hearing impairment	1=Yes; 2=No
106		No. of deaf pupils in school	
107		Hearing-impaired integration school	1=Yes; 2=No
108		No. of integrated deaf students	1=1; 2=2-3; 3=4-6; 4= > 6
109		Experience of hearing-impaired integration	1=First year; 2=2-5 years; 3=6 years or more
110		Material resources for hearing-impaired	1=Adequate; 2=Insufficient; 3=None
111		Technical aids	1=FM; 2=Magnetic loop; 3=Other
112		Human resources for hearing-impaired	1=Speech Therapist; 2=Support Staff; 3=Psycho-pedag. Team.
113		Methodological aspects. (Adapted Curriculum)	1=Pefect; 2=Good; 3=Poor; 4=Very Poor
114		Methodological aspects for the evaluation	0=None; 1=Systematic; 2=Occasional

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CONFEDERACIÓN ESPAÑOLA DE FAMILIAS DE PERSONAS SORDAS

Collaboration Agreement (MEC-FIAPAS)

STUDY ON CURRENT EDUCATIONAL STATUS OF HEARING-IMPAIRED STUDENTS

Data Collection Questionnaire
SAMPLE OF YEAR _____ STUDENTS IN SCHOOL YEAR 2005/2006

5. OBSERVATIONS AND CLARIFICATIONS (indicate item and code number)

Item	Code	Comment

Professional who submitted the interview _____

Date performed _____ Place: _____

Duration: _____ Signature: _____

Other FIAPAS publications

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