Influence of the application of an ecological direct instruction model on the level of reading comprehension*

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Abstract: Results from assessing our pupils' reading comprehension level are poor, although reading is very important in the school environment. Given the importance of teaching comprehension and metacomprehension strategies in the classroom to improve reading efficiency, a direct instruction program based on Baumann's (1985, 1990) instruction model was drawn. The aim was to offset the limitations of this type of programs by including comprehension and metacomprehension strategies and by a durable and ecological use of the program (used by teaching staff after having been trained). Personal and contextual variables that have an influence on reading comprehension were considered. The participants were 457 third- and fourth-graders (8 to 10 years of age), in experimental and control groups, who were helped to master reading comprehension strategies in an autonomous and self-regulated way. Results show an improvement on the reading comprehension level in both of the Spanish and Euskera groups who applied the program for as long as an academic year. The improvement in control groups was not significant. Improvement in the teachers' competences as well as a possible improvement in the pupils' attitude and motivation (except in the didactic unit devoted to metacognitive strategies) was also observed.

Key Words: Reading process, reading strategies, instruction program, reading comprehension, Spanish/Euskera.

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Influencia de la aplicación de un modelo de instrucción directa ecológico en el nivel de comprensión lectora

Resumen: Pese a la importancia de la lectura en el ámbito escolar, los resultados obtenidos en los estudios para determinar el nivel de comprensión lectora en nuestras aulas son decepcionantes. Dada la importancia que tiene trabajar en el aula la instrucción en estrategias de comprensión y metacomprensión para mejorar la eficacia lectora, en este estudio se ha elaborado una propuesta de programa de instrucción directa basado en Baumann (1985, 1990). Se pretende paliar las limitaciones de este tipo de programas incluyendo estrategias de comprensión y metacomprensión, haciendo una aplicación más duradera y más ecológica (aplicación por el profesorado, previa instrucción nuestra). También se consideraron las variables personales y contextuales que repercuten en la comprensión lectora. Con el fin de ayudar al alumnado a dominar las estrategias implicadas en la comprensión lectora, así como a potenciar su uso autónomo, reflexivo y auto-regulado, se realizó una experiencia con un 457 escolares (grupos experimentales y control) de 3° y 4° de Educación Primaria (8 a 10 años). Los resultados obtenidos corroboran una mejora de los niveles de comprensión lectora en ambas lenguas (español y euskera) en los grupos en los que se trabajó con nuestro programa durante un curso académico, a diferencia de los grupos control cuya mejora no fue significativa. También se comprobó una mejora en la formación del profesorado, un posible efecto de mejora de la actitud del alumnado y mayor motivación de este (salvo en la unidad didáctica de las estrategias metacognitivas) como consecuencia de la implementación del programa.

Palabras Clave: Proceso lector, estrategias lectura, programa instrucción, comprensión lectora, Español/Euskera.

INTRODUCTION

Reading is one of the most important communication tools in our society. In the school environment, where reading is considered the main criteria for adaptation, teachers often express their concern about the pupils' difficulties when identifying the main ideas of a text, or in getting the author's message.

Data such as the results of the last OCDE's PISA assessments performed on pupils in 32 developed countries, show that only a small proportion of participants (about 10%) have an optimal level of reading comprehension (OCDE, 2002, 2007). The authors (Durkin, 1979; Solé, 1987; Hare & Bingham, 1990; Cuetos, 1996) suggest that the poor comprehension skills are a consequence of the lack of activities to improve text comprehension in the classroom, as the main purpose of reading at school is that the pupils are skilled at reading words, rather than understanding texts.

Moreover, several studies (Kletzien, 1991; Sánchez, 1993a; Cornoldi & Oakhill, 1996; Fernández, Machuca & Lorite, 2002) conclude that the main difference between good readers and subjects

with a comprehension deficit during the textual process is that good readers devote longer to the active construction of the text significance. Given the importance of teaching comprehension and metacomprehension strategies in the classroom in order to create a favourable attitude and to improve reading efficiency, different intervention programs have been designed, wiht the main objective to teach one or more of these strategies (Martínez & Madariaga, 2006) to enable the interpretation and integration of the written message into the reader's patterns.

On the basis of the mentioned studies stating that readers with comprehension problems can benefit from being taught the comprehension and metacomprehension strategies that competent readers use spontaneously, we suggest an educational solution to improve reading comprehension, so that pupils can transform their poor immature reading comprehension strategies into the same strategies used by competent readers.

Our aim was to improve the contents of the instruction of this type of intervention programs, including comprehension and metacomprehension strategies and their implementation by the previously trained teaching staff, thus making possible to create an ecologically valid environment. The main objective was, therefore, that students master the comprehension and metacomprehension strategies involved in the effective development of comprehensive reading in an autonomous, reflexive and self-regulated way.

1. Theoretical basis

1.1. The processing levels implied in reading. Explanatory models

The cognitive and psychological processes involved in reading have been subject of a great deal of study in recent years, and ways of efficiently teaching reading comprehension skills have been developed. The dominant theories until the 1960s stated that reading was the capacity to decode or transform printed words into spoken words, and put stress on external factors rather than on the individual's skills (Deese, 1965). Nowadays, a different approach supported by Cognitive Psychology (Gardner, 1987) states that reading is not only deciphering a sign code, but also understanding the information conveyed by the text and integrating this information into the reader's previous knowledge. Different explanatory models of the reading process have been developed (Perfetti, 1985; Ruddell, Ruddell & Singer, 1994; Cuetos, 1996).

Nowadays, reading is conceived as a complex cognitive activity which involves processes at different levels, from recognition of graphemes to the integration of global ideas from the text into the reader's knowledge. Regarding this conception, Adams (1980) identifies three levels of processing that intervene in reading: word recognition, syntactic processing and semantic

processing. The two first are known as micro processes, whereas the last is a macro process and is related to text comprehension. The existing models differ in explaining how these processes relate with each other; essentially they differ in acknowledging or not the need to complete one of the processes in order to pass the information on to the next one. According to González (1993) these differences have given rise to three types of models: bottom-up processing (Just & Carpenter, 1987; Roelofs, 1997) top-down processing (Smith, 1971; Johnson, 1975) and the interactive model, which is more widely accepted nowadays. The latter advocate a parallel distributed processing, where top-down and bottom-up information happens at the same time (Rumelhart & McClelland, 1981; Venezky, 1984; Cuetos, 1996), so that some results may affect the processing of others (Stanovich, 1993; Brunsdon, Coltheart & Nickels, 2006).

1.2. The learning-teaching process of reading

Different approaches to reading entail different ways of understanding the teaching/learning process of reading. If we understand reading as an activity that goes beyond decoding, involving message extraction and integration within the subject's knowledge, its instruction is not limited to a mechanical skill, i.e. decod, as happens in the classroom (Rosas, Jiménez & Rivera, 2003). But it will reach the upper levels of the reading processing; it will teach the strategies that enable the interpretation and integration of the written message into the reader's patterns (Solé, 1987).

Therefore, as García Madruga, Martín and Luque (1997) suggest, the teaching of reading comprehension should consist of two stages. The first should focus on learning and mastering the basic ability to understand words; the second, which has to do with strategy and metacognitive control, should focus on the construction and integration of the text's significance into the reader's memory. In other words, after a first stage of 'letter learning', the decoding abilities stay in the background while the pupils' comprehension and metacomprehension strategies mark their reading efficiency.

Comprehension strategies embrace all aspects of information processing during reading. The appropriate use of such strategies allows an effective extraction and integration of the meaning into the reader's memory. Sánchez (1993a) classifies these actions in four groups: a) strategies to operate with thematic progression (van Dijk & Kintsch, 1983), b) strategies of global construction of meaning or textual macrostrucure construction (Ferreiro & Gómez, 1982; León, 1991), c) structural strategies or strategies to operate with the text's superstructure (Meyer, 1984, 1985; Taylor & Samuels, 1983; Kobayaski, 2002), d) strategies to access previous knowledge or to build the reader's text model (Otero, 1998; Willis, 2008).

Moreover, readers need to put into operation another set of metacognitive strategies in order to increase awareness of their own knowledge processes and their ability to control such processes according to the reading objectives (Flavell, 1979; Ríos, 1991). The right use of such strategies involves knowledge of their own cognition and control and regulation of the activities developed while reading. This implies planning the cognitive activities, controlling the process and assessing the results (Brown, 1980; Baker & Brown, 1984; Brown, 1987).

What strategies should be taught?

The search for educational solutions to improve reading comprehension that prompted this work is based on the studies stating that readers with comprehension problems can benefit from being taught the comprehension and metacomprehension strategies used by competent readers. Sánchez (1988, 1993b) considers that the main aim of such teaching should be to help pupils to transform their poor immature reading comprehension strategies into the strategies used by competent readers. From this premise and with the aim of defining which strategies should be taught, the operating differences during the textual process have been analysed, and subjects with a comprehension deficit have been compared to good readers (Oakhill, Yuill & Parkin, 1986; Kletzien, 1991; Cornoldi & Oakhill, 1996; Fernández et al., 2002). They suggest that the main difference in the way these two groups operate is that good readers devote more time to the active construction of the text significance. The strategies enabling a more active attitude towards the process of comprehension are classified by González and Marcilla (1996) as follows:

Table 1. Reading strategies based on the reader's skills.
(Adapted from González & Marcilla (1996: 67).

Good comprehension readers	Comprehension process	Poor comprehension readers
Comprehension strategies	**MICROSTRUCTURE** Propositional construction and integration	**Comprehension strategies**
Strategy theme/comments	**MICROSTRUCTURE** Propositional construction and integration	Deficiencies for establishing the thematic progression
Use of Macro rules (selection, generalisation and integration)	**MACROSTRUCTURE** Differentiation and nesting of ideas	Suppressing and copying strategy
Structural strategy	**SUPERSTRUCTURE** Text internal organisation	Listing strategy
Reading based on the text-reader's knowledge interaction	**TEXT MODEL** Text world	Reading based on the text
Metacomprehension strategies	**METACOGNITIVE CONTROL**	**Metacomprehension strategies**
Control and supervision strategies of comprehension (planning, self-regulation and evaluation)	**METACOGNITIVE CONTROL**	Rigid behaviour (no planning) and little reflection (they do not detect their own comprehension drawbacks)

Within the metacomprehension strategies described it is essential to know what difficulties low comprehension readers face. Different authors (August, Flavell & Clift, 1985; Baker & Brown, 1984; Solé, 1987; Mateos, 1991) have detected these difficulties, and Sánchez (1993a) has summarised them, indicating that low comprehension readers approach the reading process with a rigid behaviour (without planning) and with little reflection (they are not aware of their mistakes in comprehension). As a consequence of their planning difficulties, they cannot adopt an efficient behaviour faced with issues such as choosing a suitable text (necessary strategies to assimilate the text), and they cannot appreciate the level of comprehension demand.

At the same time, the poor comprehension readers' difficulties in detecting comprehension problems –and, therefore, in correcting them- can be stated in different ways: as they do not process information in a constructive way, and hence coherent representation of the complete story (macrostructure) does not happen; as they process information in a constructive way but

cannot remember inferences; or as they slow down the pace of reading (self assessing strategy) and go back more often (self correcting strategy) at the moment of an inconsistency.

1.2.1. How should strategies to improve reading comprehension be taught?

Based on the belief that immature readers can improve their comprehension by being taught the strategies that competent readers use spontaneously, different intervention programs have been designed. The authors suggest two methodologies: a) direct instruction, as a response to the demands of teaching staff to have specific material to work on reading comprehension, and b) a more general instruction applied to daily teaching.

Based on the classroom instruction in reading put forward by Rosenenshine and Stevens (1984) a number of programs have appeared labelled as 'direct instruction'. These are characterised by highlighting the need to teach the reading comprehension strategies explicitly and systematically, monitoring the pupils' answers and enabling feedback. Nevertheless, a review of the design and application of such programs indicates that most of them have some of the following limitations:

First, regarding the objectives and contents of the instruction, most programs only teach one or more strategies, and they, very seldom, combine comprehension and metacomprehension strategies.

Second, regarding their application, programs are frequently applied by professionals who do not work in the classroom, or who do not even work in a school, which makes it impossible to create an ecologically valid environment. The instruction ecology is one of the main factors in determining the success or failure of educational interventions (Baumann, 1985; Carriedo & Alonso, 1994). In reverse, when teachers implement the program in the classroom, limitations are usually found in their lack of knowledge of the theory and the procedure (Espín, 1987; De Miguel, 1999; Mata, 2003).

Third, we have not found a single program in Euskera, which is a hindrance in the case of the Basque Autonomous Community (BAC) in Spain, that has a bilingual educational system where both Spanish and Euskera are official languages.

In short, these reflections show the need to make a program for the direct instruction of reading comprehension and metacomprehension strategies, to be drawn up in Spanish and Euskera, and designed for use in the classroom by trained teaching staff. The knowledge and experience acquired through applying this program would also enable teaching staff to include this type of strategy in their daily classroom routine. This would entail an optimum ecology of the instruction and an improvement in the teachers' competences.

1.3. Our program proposal

Direct instruction programmes have limitations, but we still choose them because they are efficient, provided that a proposal to palliate limitations is drawn up. Our proposal is based specifically on Baumann's 'Teaching Main Idea Comprehension' (1985, 1990), characterised by gradually moving the learning responsibility from the teacher to the pupil. This gradual change is possible by using the following five steps in each didactic unit:

1. Introduction: The teacher explains the purpose of the activity to the pupils and the reason why acquiring this ability will help them to read better.

2. Example: The teacher explains with an example how the ability to understand the relationship between texts will help them to understand better what they are reading.

3. Direct instruction: The teacher explains, describes and shows the ability to be taught.

4. Application steered by the teacher: The teacher starts the task, monitors the students, and helps the students to put the ability into practice.

5. Individual practice: The students, through practical exercises, use the ability individually.

Baumann (1985, 1990) concluded that this model was more efficient than traditional instruction, consisting of specific books for reading, and more efficient than activities to develop significant vocabulary. But his model had three limitations: the instruction lacked ecology, the evaluation was efficient only after long periods and his model could not be applied to other comprehension strategies. In order to offset these limitations, Baumann (1985) suggests: training the teaching staff so that they can apply direct instruction in their own classroom, increasing the length of time devoted to comparing the results between the pupils receiving a traditional instruction and those following a direct instruction model to at least one year and apply the method to the teaching of other strategies on top of the main idea comprehension. Our proposal is an attempt to overcome these limitations.

The constructivists also criticise the pupils difficulties in generalising and transfering direct instruction to other contexts (Solé, 1992), but Solé also mentions that if direct instruction is contextualised, significant teaching of comprehension strategies can be achieved. This means that significant learning from these strategies takes place from the pupils' previous knowledge and interests (concepts, schemes and experiences).

1.4. Variables influencing the level of reading comprehension: Personal and contextual variables

When applying programs of instruction of comprehension and metacomprehension strategies, a number of variables are controlled in order to relate the pupils' development to the instruction received. We apply personal and contextual variables. Personal variables significantly influence the reading output are: intelligence (Baumann, 1985; Raven, Raven & Court, 1995), vocabulary level (Anderson & Freeboy, 1980; Suarez, Seisdedos & Meara, 1998) and attitude toward reading (Baumann, 1990; Alonso, 1991; Ruddell et al., 1994; Guthrie & Wigfield, 1999). Contextual variables can be school related or not. School-related contextual variables refer to teachers, the instruction methodology and, in our case, the linguistic model (Etxeberria, 1999), and they are all taken into account in our design. Contextual variables which are not school related are family related: the family socio cultural level (Cohen, 1975; Jiménez, 1988) and the family attitude towards reading (Espín, 1987; Edelsky, Hudelson, Flores, Bakin, Altwerger & Jilbert, 1983).

2. Method

2.1. Participants

The project was carried out in 7 schools (4 private and 3 public) in the town of Santurce (Spain), which meant that it involved most of the school population of a town of 50.000 inhabitants (97,27% of which were Spanish speaking). There were 457 pupils in 25 classrooms in the 3rd and 4th years of Primary Education (aged 8 to 10) divided into four groups, experimental A, experimental B, control A and control B as follows:

Table 2. Distribution of the sample.

Group	Experimental A	Experimental B	Control A	Control B	Experimental	Control	Total
3rd Primary	90	47	23	76	137	99	236
4th Primary	28	68	94	31	96	125	221
Summary	118	115	117	107	233	224	457

Experimental A=	Teaching in Spanish and using the Spanish version of the program
Experimental B=	Teaching in Euskera (totally/partially) and using the Euskera version of the program.
Control A=	Teaching in Spanish, not using the program
Control B=	Teaching in Euskera (totally/partially), not using the program.
Experimental=	All the experimental groups
Control=	All the control groups

In the control groups, teachers were not involved in the intervention program and a follow-up was carried out to ensure that their teaching did not interfere with the experience.

2.2. Instruments

The following standard tests were used in the data collection phase:

De la Cruz's ECL 1 and 2 Tests (1999) for the evaluation of reading comprehension.

De la Cruz's ECL 1 Test. (1999) Irakurriaren Ulermenaren Ebaluaketa Euskera version of the previous test.

Raven's Test of Progressive Matrices. SPM intelligence test (2001).

EVOCA Test (Battery 1) by Suárez, Seisdedos and Meara (1998) for the evaluation of the level of vocabulary in Spanish.

Reading Attitudes Scale. Inspired by Paul Campbell's (1966) inventory of reading attitudes presented by Espín (1987).

On top of the above tests, 4 questionnaires were drawn up:

Questionnaire 1: To evaluate the pupils' perception of the degree of reading and language use within the family unit.

Questionnaire 2. To record the parents' level of education.

Questionnaire 3. To record the teachers' opinions about the adequacy of the different aspects of the program.

Questionnaire 4. To record the pupils' appraisal of the program.

2.3. Design and procedure

A non experimental ex post facto, design of two independent groups (instruction program vs. control) was used for each of the languages used in the school (Spanish and Euskera). The level of reading comprehension before and after the educational intervention was compared, and the personal and contextual variables that may significantly influence the process were controlled.

The study was organised in two stages. The first stage took place before the educational intervention -we called it pre intervention- where a direct instruction program of reading comprehension was designed and the level of reading comprehension in the two languages was evaluated, as well as the personal and contextual variables. The second stage consisted in the educational intervention itself, that happened in two academic years, and that was carried out in two different stages, as well. The first stage was the program application after training the teachers, and the post intervention, where the reading comprehension level was tested again. The aim of second stage was to connect the acquired strategies with the daily learning experiences at school, which is not described in this paper.

The pattern followed during the whole process is explained in Table 3. For each stage, the sequence of the different activities in which the different groups took part is explained.

Table 3. Description of the stages of the process.

STUDY STAGE	ACTIVITY SEQUENCE	PARTICIPATING GROUPS
PRE INTERVENTION	A) DESIGN OF A DIRECT INSTRUCTION PROGRAM FOR READING COMPRHENSION (Spanish and Euskera versions). B) VARIABLES PRE TEST: Reading comprehension (Spanish and Euskera), intelligence, vocabulary level, students' attitude towards reading, family language, parents' level of education.	Experimental A and Control A (tests Spanish version) Experimental B and Control B (tests Euskera version)
INTERVENTION	A) INSTRUCTION OF TEACHERS IN THE STRATEGIES OF READING COMPREHENSION B) PROGRAM APLICATION IN THE CLASSROOM BY THE TRAINED TEACHERS C) TRADITIONAL INSTRUCTION	Teachers of groups experimental A and B Experimental A (Spanish version) Experimental B (Euskera version) Control Grups A and B
POST INTERVENTION	VARIABLES POST TEST: Reading comprehension (Spanish and Euskera)	Experimental A and Control A (tests Spanish version) Experimental B and Control B (tests Euskera version)

Below is a detailed description of the three stages of the study: pre intervention, intervention and post intervention.

2.3.1. Previous stage to the educational intervention: Working out the program and variables of the pre test measurement

In the pre-intervention stage a program of direct instruction of reading comprehension addressed to 2nd cycle primary education students was drawn up, seeking to improve the limitations identified in the introduction.

The general objective was to help the students master the comprehension and metacomprehension strategies involved in the effective development of comprehensive reading, foster their autonomy, reflection and self-regulation.

We considered the Second Cycle of Primary Education as a suitable level to start the explicit teaching of reading comprehension and metacomprehension strategies, as students at that level are in the fourth stage of the reading development process, described by Lerner (1977) as the 'Multiple viewpoint stage', where reading comprehension is envisaged as a tool to enrich the pupils' experiences and to cultivate their taste for reading.

The program was designed both in Spanish and in Euskera.

The program consisted of six didactic units with narrative and explanative texts, ranked by their level of difficulty as suitable for children between 8 and 11 years of age.

Didactic units 1, 2, 3, 4: The strategies of thematic progression and the ones addressed to the construction of the text macrostructure are dealt with, the following objectives: to acknowledge the connecting theme between the text ideas, to extract every aspect that refers to this theme (comments), to differentiate the text's "main idea" from the "details", and to select the text's main ideas, evaluating every idea in relationship to the rest.

Didactic unit 5: The structural strategy is dealt with, the following objectives: to acknowledge the rhetoric organisation (superstructure) of the tales or stories, to encode the information within the corresponding superstructure to the text object of study and to use the same organisational pattern as a general plan to retrieve the information.

Didactic unit 6: The strategies of metacomprehension and those oriented to the construction of the text model are dealt with, the following objectives: to formulate and verify hypotheses before, during and after reading, to establish relationships between the information given by the text and the reader's previous knowledge and to plan, supervise and assess comprehension.

Once designed, and before the intervention, the program was evaluated. Three experts (the person in charge of primary education in a Centre for Pedagogic Resources, and two primary education teachers with more than 10 years of teaching experience who were not involved in the experience) and 13 teachers participating in the program were interviewed individually. The theoretical basis, objectives, activities, texts and methodology were positively assessed by the experts. The participating teachers expressed their difficulties in understanding the theoretical basis and a certain resistance, as they thought it was irrelevant to the program. Their opinions reinforced our perception of the need to train the teaching staff in reading comprehension and metacomprehension strategies.

In this stage, the level of reading comprehension in Spanish and Euskera and all the significant personal and contextual variables were also measured: intelligence, vocabulary level in Spanish, pupil's attitude towards reading, family language and parents' level of education.

2.3.2. Stage of the educational intervention

In this stage, the trained teachers applied the program in their classroom. The main aim was to make it clear to the teachers and the pupils which strategies would be used to attain a good level of reading comprehension. This intervention was designed in two clearly different stages: the previous training of the teaching staff and the program application.

2.3.2.1. Training of the teaching staff

Many authors (Baumann, 1990; Carriedo & Alonso, 1994; Mata, 2003) express the importance of training the teaching staff in comprehensive reading and the need that their training enables them to use comprehensive reading strategies in the classroom.

Using the teacher training program designed by Carriedo and Alonso (1994) as reference to work on the 'main idea comprehension' in the classroom as to improve the pupils' comprehension, the teachers were trained envisaging two main objectives:

- To make clear the strategies involved in the development of comprehensive reading.

- To train the teachers both, theoretically and methodologically, to apply the program.

Thus, the teaching staff were trained to provide the necessary theoretical and methodological skills for a more efficient application of the direct instruction program. With this aim, three 60-minute meetings were programmed with the 13 teachers of the seven schools involved in the program. The teachers were trained in: the need to teach to understand, the strategies implied in the effective development of reading comprehension, and the theoretical and

practical grounds of direct instruction. A guided reading of the direct instruction program took place. The working material was the program itself, together with a basic bibliography about instruction in comprehension and metacomprehension strategies.

2.3.2.2. Applying the program in the classroom

The program was applied as follows: once trained, the teachers devoted 1 hour per week for 8 weeks to the direct instruction of reading comprehension and metacomprehension strategies by carrying out the 6 didactic units included in our program. During that time, we were in contact with the teachers to answer questions.

In order to achieve the objective of mastering the comprehension and metacomprehension strategies implicit in comprehensive reading, attention was focused on the way of using the program rather than on the text contents. Therefore, the contents of the instruction were procedural rather than conceptual. This format implied that the teachers use the program as an opportunity for themselves and for the pupils to make clear what strategies are important and what they consist of (Sánchez, 1993a).

In addition, based on a revision of programs and research work on the teaching of comprehension and metacomprehension strategies, the following order of instruction was adopted:

1. Strategy of thematic progression.
2. Strategies aiming at the construction of textual macrostructure.
3. Strategies to operate with text structures (structural strategy).
4. Strategies of connection of the text information to the reader's previous knowledge.
5. Metacognitive strategies of comprehensive reading.

This sequence meant approaching the texts from thematic progression to global organisation, reaching a certain degree of comprehension through instruction in comprehension strategies before teaching the metacognitive strategies (Sánchez, 1993b).

With the aim of analysing the influence of the personal variables of the pupils following the reading comprehension program in Spanish and Euskera before starting the educational intervention, the following variables were assessed: intelligence, vocabulary level in Spanish, pupil's attitude towards reading, family's attitude towards reading, parents' level of education, reading comprehension in Spanish and Euskera.

2.3.3. Stage of educational post intervention

Once the intervention finished, a second assessment of reading comprehension was carried out, and the questionnaires relating to the teachers and students' opinions of the program were collected. The participants (teachers and pupils) were asked to assess the relevance of different aspects of the program (theoretical basis, level of participation, didactic objectives, methodology, activities and texts) and the relevance of the program as a whole.

The data were processed using SPSS/PC+ software. The level of significance in the work was 0.05.

3. Results

3.1. Considerations prior to the data analysis

In order to prevent the results of the reading comprehension level from being contaminated by factors alien to the intervention, we selected subjects whose score in the previous reading comprehension test was lower than the 75th percentile, -as the pupils with a higher percentile could not improve very much- and subjects whose score in the previous reading comprehension test was higher than the 25th percentile, -as a lower percentile could indicate difficulties in the reading micro-processes and these pupils could be influenced by the effect of regression to the mean. The same criteria were applied in both languages.

Furthermore, only those subjects whose score in the IQ test was extremely below and above the average were selected, as intelligence plays an important role in reading comprehension (August et al., 1985; Álvaro, Bueno, Calleja, Cerdán, Echevarría, García, Gaviria, Gómez, Jiménez, López, Martín-Jabato, Mínguez, Sánchez & Trillo, 1990).

We made sure that scores of the two main groups (experimental and control) had a symmetrical distribution according to the normality law considering, the level of intelligence and vocabulary level, except experimental B and control B groups, in which the vocabulary; were not strictly distributed according to the normal curve.

Regarding the reading comprehension in Spanish, the two experimental groups were distributed almost symmetrically according to the normality law, but the two control groups had a tendency towards positive asymmetry. As a consequence, there is a difference in the initial reading comprehension in Spanish, which was taken into account in the ANCOVA analysis by considering the reading comprehension in Spanish pre-test results as co-variant.

Regarding the reading comprehension in Euskera, the results obtained by the experimental

group were almost symmetrically distributed, although they did not strictly conform to the normality curve. The distribution of the control group showed a slight tendency to a positive asymmetry. These results hinted at significant differences in the initial reading comprehension in Euskera between the experimental group and the control group. The significant differences between the two groups were confirmed and were taken into account in later analysis.

Very positive scores were obtained in both, the pupil's attitude towards reading and in the family's attitude towards reading. Nevertheless, we took into account the error caused by the 'desirability effect' and treated these data with reservation.

Finally, regarding the parents' level of education, data collection for this variable was very difficult and only 54,5% of the total members in the sample provided it. Based on the data obtained, it was concluded that three levels of education (primary, secondary and higher education) were equally present in all four groups.

3.2. Data analysis

3.2.1. Reading comprehension level

In order to analyse the possible improvement in reading comprehension, the 'T test for related samples' was used. The results show that both groups, experimental A and control A, improved their average reading comprehension level in Spanish, but only the group experimental A improved significantly.

Table 4. Reading comprehension level in Spanish.

Group	N	Mean	S.D.	t	Sig (bilateral)
Experimental A	53	-11,94	26,45	-3,287	0,002
Control A	55	-4,80	23,13	-1,539	0,130

Regarding the reading comprehension level in Euskera, experimental group B improved their results significantly unlike control group B, as can be seen in Table 5:

Table 5. Reading comprehension level in Euskera.

Group	N	Mean	S.D.	t	Sig (bilateral)
Experimental B	69	-8,43	31,18	-2,247	0,028
Control B	51	-6,45	24,73	-1,863	0,068

In Tables 4 and 5, the negative average difference between the pre test measurement and the post test measurement shows that the second is higher, which means that there has been an improvement in the level of reading comprehension.

3.2.2. Multivariable analysis

Below, the multivariable analysis carried out are described in order to verify the possible influence of personal variables and context in the pupils of experimental groups in the improvement on their level of reading comprehension in both languages, that turned out to significant. For this purpose, an analysis of covariance (ANCOVA) was carried out for each factor in the reading comprehension post test in both languages, taking their pre tests as covariant. Of course, we made sure that this covariant (pre test score in reading comprehension in Spanish and Euskera) was significant (p= 0.000) which proved that the model used fit for the purpose. In other words, taking into account the pre test scores incorporated relevant information for the study of the pupils' in function of the analysed factors.

3.2.2.1. Subject variables. Influence in the improvement of reading comprensión.

First, we describe the analysis carried out with the post test scores in reading comprehension in Spanish and the subject variables. Then, we will proceed in the same way with the post test scores in reading comprehension in Euskera.

The influence of intelligence, vocabulary level in Spanish and the pupils' attitude towards reading in the improvement of reading comprehension in Spanish of the experimental groups was assessed. Results showed that in the experimental groups the level of vocabulary in Spanish was a significant factor in the Spanish reading comprehension scores [(F(2,221)= 5.846; p= 0.003)] but this was not the case in control groups. In the control groups, the pupils' attitude towards reading was a significant factor in the Spanish reading comprehension scores [(F(1,213)= 4.121; p= 0.044)], while it was not in the experimental groups. Finally, intelligence did not influence the improvement of reading comprehension in Spanish, as the pre test co-variable 'reading comprehension in Spanish' had been included and the influence of intelligence was already accounted for.

The influence of intelligence and the pupil's attitude towards reading in the improvement of reading comprehension in Euskera of the experimental group was assessed. The pupil's attitude towards reading was found to be a significant factor in the Euskera reading comprehension test scores in experimental group B [(F(1, 108)= 9.242; p= 0.003)], while it was not significant in control group B. Both in the experimental group [(F(6, 103)= 3.220, p= 0.006)] and in the

control group [(F(6, 100)= 2,234, p= 0.038)] intelligence proved to be a significant factor in the improvement of the scores in reading comprehension in Euskera. This variable proved to be very important in this case, since even though it had been controlled previously, it still had an effect.

3.2.2.2. Context variables. Influence in the improvement of reading comprehensión.

In the same way, we describe the results of the analysis made with the post test scores of reading comprehension in Spanish and the contextual variables. Then, we will proceed in the same way with the post test scores in reading comprehension in Euskera.

The possible influence of the parents' level of education and families' attitude towards reading of experimental groups in the improvement of reading comprehension in Spanish were established. The results indicate that the parents' level of education was an influential factor in the improvement of reading comprehension in Spanish in the experimental groups [(F(2,131)= 4.429; p= 0.014)] while it was not the case in the control groups. But we still cannot suggest that this is conclusive data as only 54.5% of the total cases were registered. Regarding the families' attitude towards reading, we need to point out that this was not a significant factor in the improvement of the scores of reading comprehension tests in Spanish for the experimental groups, while it was significant for the control groups [(F(1,216)= 9.193; p= 0.003)].

Regarding the level of reading comprehension in Euskera, the results indicated that the parents' level of education was not a significant factor for experimental group B. Finally, the family's attitude towards reading appeared to be a significant factor in control group B [(F(1, 105)= 4.982; p= 0.028)], but not in experimental group B.

3.3. Evaluation of the program development

This evaluation was done at the end of the program with the objective of assessing its relevance and the teachers' and pupils' opinions of the process. The questionnaire was filled in by the 114 pupils who had followed the program in Spanish and by the 76 pupils who had followed the program in Euskera. The general conclusions from these questionnaires are as follows:

a) Most of the pupils perceived that following the program helped them improve their comprehension of texts.

b) Most of the pupils showed interest in continuing with this type of activity.

c) Most of the pupils enjoyed teamwork better than individual work.

d) There was no consensus on the activities they liked best or least.

Personal interviews based on a questionnaire were conducted with 6 Spanish teachers and 7 Euskera teachers. The following general conclusions can be drawn:

a) Teachers considered that the training they received helped them understand the theoretical foundations but suggested that less specialised vocabulary and more examples would help them better.

b) All teachers stated they were very comfortable with the methodology used.

c) Teachers also valued the pupils' motivation, although some of them agreed that unit 6 (metacongnitive strategies) was the least motivating, probably due to the pupils' difficulty in reflecting on their own understanding.

d) There was no consensus about the difficulty of texts and activities in Spanish, although some teachers asserted that for units 1, 2, 3 and 4 an individual practical activity was enough.

e) Finally, the opinion feedback was very well thought of by both teachers and pupils.

CONCLUSIONS

The results demonstrate the effectiveness of our direct instruction program of reading comprehension and metacomprehension strategies in both its versions, Euskera and Spanish. Indeed, pupils in the experimental groups significantly improved their reading comprehension level in the language in which the instruction was carried out. The results also seem to support the thesis that the type of instruction at schools does not improve the level of the pupils' reading comprehension since the pupils who continued with traditional teaching did not improve significantly their reading comprehension in any of the two tests.

Another result which is not proven and will need more specific research is the possible improving role that the program had in the pupils' attitudes. Indeed, our analysis indicates that attitudinal variables were significant in the improvement of reading comprehension in Spanish in the control group, but not in the experimental group, which should not happen unless some special condition has fostered this factor. If the program itself proved to be the cause, then we could establish another good effect of using it, which would be an increased interest in reading. If we refer to reading comprehension in Euskera, the possible tendency seems to be less likely. The direct instruction program seems to have some shortcomings too.

The first shortcoming is the apparent importance of pupils' vocabulary level in their progress in Spanish. The results indicate that the vocabulary level in Spanish and the parents' level of education, which are highly correlated, are significant factors in the pupils' progress in the Spanish version. In fact, subjects with a low level of vocabulary in Spanish (who did not reach the 25th percentile in the EVOCA test) did not improve their reading comprehension scores in Spanish after teaching them in this program. Therefore, when pupils have a low level of vocabulary, it is not recommended to apply the reading comprehension instruction program or, as Baumann (1985) points out, instruction in the program vocabulary would be needed prior to its application.

Secondly, we cannot ignore the differences between the pupils' motivation towards the program regarding the different strategies applied. Thus, in evaluating the program, most of the teaching staff agreed that didactic unit 6 (metacognitive strategies and construction of the text model) was the least motivating for the pupils. This opinion was shared by the students, as they found the activities in this unit more difficult and less attractive. According to the teachers, the cause of this appreciation was not the didactic unit design but the pupils' difficulties in reflecting on their own comprehension. This feedback makes metacognitive strategies in the classroom even more relevant.

Finally, another limitation we detected was that most of the teaching staff participating in the training sessions experienced difficulty in following the theoretical basis of our program. The training phase was, therefore, very enriching for all of them. After the training period they all admitted feeling a lot more prepared to work on reading comprehension in the classroom. This could also have helped their pupils improve their reading comprehension, thus reinforcing the hypothesis that suggests that the most important improvements in education correspond to the teachers' improved skills. Therefore, the use of this type of program, apart from improving the pupils' reading comprehension skills, could also increase the teachers' awareness of their instruction, as their knowledge of the subject is improved. This awareness could also foster a way of approaching texts in any curricular area in the classroom; in other words, using the strategy on a wide range of classroom activities. As Sánchez (1993a) points out, this would be the most effective way of introducing comprehension and metacomprehension strategies into the school curriculum.

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