

Intervention in Learning Difficulties with children with Attention Deficit Hyperactivity Disorder (ADHD) at Primary School: A North of Portugal Research

Maria A. Leal, Pedro M. Dias

Abstract — This article is based on a Teachers Training Programme involving Primary School teachers who has students with Attention Deficit Hyperactivity Disorder (ADHD) and it describes a part of the research dissertation on the course of PhD degrees in Science Education in the Catholic University in Porto, Portugal. The aim of our research is based on testing an approach, both training and acceptable involving teachers with ADHD in their classrooms, focusing in the identification of the barriers connected with ADHD, plus teaching methods, strategies and instructional management of practical use and concerning the intervention on barriers resulting from the attention deficit such as reading, writing, maths and oral speech. The research involved 20 teachers and 20 children of Primary School in 19 schools of the north of Portugal and it occurred between November 2009 and February 2010. The method used was the Investigation-action which appeared to be useful in the intervention with ADHD children through the effective use of the acquired knowledge, reflection, evaluation and reformulation of teaching methods. The results of this intervention revealed to be successful, because ADHD children performance showed a progress in the barriers connected with attention deficit and the achievements in reading, writing, maths and oral speech.

Index Terms — Attention Deficit Hyperactivity Disorder (ADHD), Attention Deficit, Learning Barriers, Educational Strategies of Intervention in the classroom.

1 INTRODUCTION

The Attention Deficit Hyperactivity Disorder (ADHD) is a complex disturb which affects many children, estimated between 3% and 7% of children, it means that 2 ADHD children among 30 Children [1:18]. This disorder becomes evident when these children start Elementary Education, as it is referred by Barbosa [2:72] in a study she conducted in the North of Portugal. In that study involved 111 ADHD students, the results were the following: 10% of ADHD children at Kindergarten (3 to 5 years old), 63% of ADHD children at Primary Education (6 to 10 years old) and 27% of ADHD students at Secondary Education (11 to 15 years old).

Pujol and his assistants [3:8] claim that most of the children with ADHD in school age have associated problems. 19% to 26% reveal

learning difficulties in reading, writing and maths, resulting from these a lower educational performance as it is expected for their age and education level. We also verify that in Portugal Teachers training towards this disorder still is not enough and it is proved that training is crucial for helping their children to overcome their difficulties at an academic level [4],[5]. Knowing this problem and in order to achieve a right intervention in the problems within ADHD, we decided to implement – using an Intervention-action design - an Educational Programme for ADHD Children Teachers in Primary School, with the following goals: testing a programme of training skills which involved (i) the knowledge of Attention Deficit Hyperactivity Disorder, (ii) plus educational strategies to be implemented in classroom – intervention on behaviour, attention and academic performance, and (iii) to provide skills to act according to the problem – adapting teaching methods.

In this article we only describe the intervention related with academic achievements problems.

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2 THEORETIC SUPPORT

2.1 ADHD and learning difficulties

One of the problems concerning ADHD more discussed in scientific works is, obviously the Learning difficulties, and still are a matter of discussion among the experts.

The ADHD and the Learning Difficulties, according to several specialists [6], [7], [8], [9] are two problems that are connected and according to Lambert and Sandoval studies [8:185] more than 80% of children with ADHD have Learning Difficulties. These are explained through the disturb characteristics, as the lack of attention, the impulsivity and the excessive motor activity damage, beyond other factors, the concentration and frequently the academic improvement [8:195].

Recently further studies were conducted in Portugal regarding these two problems, involving elementary education classrooms with ADHD children in the North [2], Middle [10] and South [11] of the country. Our research [2] occurred in the North and tested ADHD children in order to see if their academic performance were much below the average level of the class, and we verify that: 89% in Portuguese, 81% in Mathematics and 70% in "Estudo do Meio" (History and Geography). We also verify that 83% of the children involved in the research have extra educational support (other teacher to help them in their academic difficulties once or twice a week) and, although some improvements in heir learning process were achieved, but they did not reach the average level of the class [2:104], [12:124]. These results are similar of those after research conducted in the Middle [10] and South [11] of Portugal. It seems that the academic areas where a major concentration and study are demanded are, as well, the areas where these children have more difficulties [2],[12],[10],[11] showing significant difficulties in their academic performance [13:95].

2.2 Intellectual Development and Academic Performance

The intellectual development and the academic performance are two factors which are connected to the learning context. Therefore we question ourselves if the intellectual development of an ADHD child interferes, or not, in his academic performance.

According to Bohline [8:92] and Felton & Wood [8:92] the reason why ADHD children

frequently show a lower academic performance cannot be taken as a result of a low intellectual development, because other factors can be involved such as teaching methods and others.

Recent studies [14] carried on with children and teenagers with or without ADHD about the ability of understanding complex sentences, revealed that children and teenagers with ADHD are slower and less efficient comparing to their classmates, regarding the understanding of complex sentences they have an increase risk of a weak academic performance.

Having this in mind, besides being still controversial and not very clear to define the intellectual development of ADHD children, it is agreed that these children effectively show lower levels of academic performance and significantly below to their own capacities, it might become from their characteristics: attention deficit, impulsivity and an excess of motor activity [8:93]. Lopes [8:94] still confirms that regarding the flunking, temporary dismissal and expulsion are higher among children and teenagers with ADHD.

2.3 Language and Speech Development

In what concerns the development of language and speech among children with ADHD, maybe due to the characteristics of the disorder, they are very talkative children [8:95].

This aspect implies in a classroom context that they talk when they should be quiet, or they talk about irrelevant subjects, besides, their own speech is less accurate, less fluent and containing enunciation deficits, compared to the other children [8:95]. However there are still no evidences which show that ADHD children reveal language problems, but when they appear they generally reflect more in expressive language. Concerning this, Lopes [8:95] considers that the language problems turn to become more relevant if the child has learning difficulties. Agreeing with this, Pujol and Almeida [15:5] refer that in most cases the thought of these children "runs" faster than the language sometimes there is not a simultaneousness between the thought and the speech. They still added that children show a lack of organization and reflexion in their thought and it originates several problems in oral speech such as: a speech without meaning, to move quickly or avoid the steps of a sequence and talk about subjects which are not related to the issue [15:5].

2.4 Problems arising out of the Attention Deficit

Lopes [8:77] refers that the contradictions among specialists about this subject are numberless. On one hand, they defend the existence of specific deficits, for example, in the ability of processing, which contributes to the lack of attention; on the other hand they consider that those deficits do not exist but handicaps of self mental and behaviour regulation. More appropriate will be, according to the author, to define the specific aspects of attention in order to be studied, measured and intervened, putting the further concepts in a well enunciate and complete reference chart.

The studies conducted by DuPaul and Stoner [13:96] claim that if we accept the ADHD children have attention problems (even secondary, depending on their sub-type) the probability that their performance in tasks which demand more attention, concentration and effort will be lower than their classmates. The studies carried by Top [16:137] consider that the most serious problems found in ADHD children derive from the attention deficit which originates problems in their learning because they are not able to control their lack of attention, damaging their fulfilment and consequently their academic performance.

2.5 Reading Problems

The most common problem found in ADHD children with Learning Difficulties is the reading problem [17:222], O'Reilly [13:158] states that "*children with ADHD seem to present a greater risk of reading problems than their classmates whose academic development is normal*".

Hademann [17:223] asserts that there are no doubts about the existence of co-morbidity between the ADHD and the reading problems (RP), due to a great proportion of ADHD children fulfil the RP diagnosis. According to Pujol and Almeida [15:4] the children with ADHD, due to their impulsivity and attention deficit, their reading is sudden and inaccurate, what leads to a misunderstanding of the texts, making word mistakes. The most common mistakes are the following: *Omissions* – omitting letters in words, or words in sentences; *Additions* – adding letters or words; *Repeat* –repeating words already read; *Replacements* – switch letters or words by others; *Hesitation* – taking more time in reading words or sentences; *Incorrect vocalization of the words* during reading time,

because of the speed. The authors also refer that the errors of punctuation, in the use of commas, periods, intonation and accentuation are very usual.

In their studies Incioglu [18:188] refers that the reading problems can be divided in two aspects: First Aspect – *Rotation* – the letters *b,p* are read as *d,q* respectively, as if they suffer a rotation; *Inversion* – at the same way the letters are read inverted, *w* by *m* and *b* by *p*; *Replacement* – some letters by others; *Recognition errors* – difficulty in remembering the name of the letters and their sound; *Distinguish Errors* – difficulty in distinguishing similar letters or sounds; *Spelling errors* – difficulty in spelling. Second aspect – The reading difficulty will cause writing difficulty and then the unwillingness in doing the tasks connected with those abilities, as well as the learning failure in the academic areas (portuguese, mathematics, sciences, ...) plus the difficulties in oral language.

2.6 Writing Problems

According to Pujol and Almeida [15:5] the ADHD children, in general, show a weak motility presenting difficulties in coordination and manual accuracy, which it will be reflected in doing some tasks that require skill, such as: colouring, cutting, handling small pieces and, in the writing they present an inaccurate writing and disorganised.

They also present problems when they copy, either from the book to the note-book, either from the board to the note-book. The most frequent errors are the *omission* of letters or words, *replacement* of letters or words, *punctuation accentuation* errors. It is even referred some incorrect spelling as well as difficulties in memorising language rules and how to put them on. Other difficulties are also described regarding the inability to put their ideas in writing, because they are unable of producing an organised text, as well as to put the events in the right sequence.

2.7 Mathematics Problems

In general, children with ADHD who reveal reading problems also have problems in Maths. The reading and the understanding are the same for the understanding of Maths [19:392].

In what concerns the problems in this academic area, the children with ADHD [15:4] reveal difficulties in three levels: (i) in the conversion from concrete to abstract, (ii) in the use of logical thought and (iii) in understand the questions for solving Maths

problems. In literary works some difficulties are referred in this area: reading errors and understanding of the questions, overcoming or forgetting the important issues for solving the problems [15:4], difficulties in memorising and remembering basic concepts, such as multiplication table, calculus difficulties, as well as solving arithmetic operations [20:170].

3 METHODOLOGY

In order to do our study we adopt the method Investigation–action, because we wanted the educational professionals to be more reflexive and more intervening in the educational context. We still think that together with this interactive method it is necessary to identify and reformulate the problem in a more objective way in order that the instructional managements can be successful [21:137].

3.1 Study Development

We decided to direct our training programme to the General Education Elementary (primary school) Teachers with ADHD children in their classes and to the Special Needs Teachers, because they have a closer proximity and spend more time with children with this disorder. The research sample involved 20 teachers from 19 basic schools in the North of Portugal that met the inclusion criteria stated above. Each one of them worked with a child with ADHD in a classroom context.

The training programme occurred during 3 months, in a post-labour schedule, lasting 50 hours, divided in 25 hours as workshop (10 sessions) and 25 hours of teacher's individual work. During the workshop the following issues were studied:

- General knowledge of ADHD – Characterization, Etiology, Diagnostic, Self-concept and Relationships with the ADHD child;
- Intervention in ADHD – Pharmacological, Behavioural, Mental-behavioural and Multimodal;
- Intervention in School Context – Teacher's attitude, Physical changes, Classroom Management, Educational environment, Behaviour Problems, Academic performance problems: attention, reading, writing, mathematics and oral language problems;
- Intervention Strategies in ADHD – Intervention Strategies in Behaviour

Problems and Intervention Strategies in Academic Performance for: attention, reading, writing, mathematics and oral language problems;

- Reflexion and analysis of the interventions (developed in each session).

During the intervention in academic performance problems, the teacher identified the problems of the ADHD child and thought about the most probable goals in order to increase his academic performance (attention, reading, writing, mathematics and oral language). Then the teacher defined the strategies and materials he had implemented, always making an evaluation of his work, recording his procedures in a portfolio.

4 PRESENTATION AND DISCUSSION OF THE RESULTS

To analyse the interventions related to the problems of the ADHD children, we decided to analyse the documents of the portfolio made by the teachers during the Training Programme. For analysis, we formed two different groups of the studied children: one group with ADHD children of the compound type and the other group ADHD children without an identified subtype.

We verify that 19 of the 20 children studied have problems in their academic performance, being the attention and concentration problems the most evident in 18 children; followed by mathematics problems in 11 children, the reading and writing problems affected 9 children and only 4 children showed problems in oral language. Concerning the changes in the classroom we verify that 50% of the teachers made the changes in the environment, changing not only the place where the ADHD child sat but also the disposal of the seats, tables, and other materials in classroom: 5 children with ADHD changed from the bottom of the classroom to the front seats very near the teacher's desk; other child changed from one of the sides of the classroom to a place near their classmates and to a front seat near the teacher; the last 4 children were already seated at the front, however two changed to places far from the window and the other two were placed near the teacher's desk. These data confirm the studies about the position of the child with ADHD in the classroom [19:391] claiming that this child should be placed near the teacher and far from the windows, doors, furniture and materials or

equipments, in order to avoid inattention. Other authors still claim that the fact of the child being near the teacher provides visual contact and supervision, giving the child a sense of safety [3:24].

4.1 Intervention in Attention Problems

In what concerns the attention/ concentration problems of ADHD children and according to the problems described and worked by the teachers, we grouped them as following:

- Before the task – 4 children: *do not listen the instructions* (3) *not paying attention to the instructions* (1);
- During the task – 17 children: *not paying attention of the tasks to be done* (2), *not organised in doing the task* (2), *not motivated and do not end the task* (3), *do not end the task* (9) and *only does the task with help* (1);
- Results of the task – 18 children: *incomplete tasks* (12), *incorrect tasks* (4) and *disorganised and not well done tasks* (2).

In the group of children with ADHD compound type, 10 children were studied and in 8 children: most of them did not finish their tasks, 2 children had incorrect tasks because they did not pay attention and only 1 child did not listen the instructions. In the group of children with ADHD without an identified subtype, the teachers verify 15 attention problems in 10 children. The problems identified by the teachers, show that the academic performance of these children are very low, and this can be justified through the studies carried on by DuPaul and Stoner [13:96].

The strategies used in the major number of the problems (6) were: *a closer proximity with the teacher*, *short tasks* and *a clear and spaced explanation*. The *Visual Symbols Ruler*, the *Self-Instruction* and the *Self-Evaluation* were used in 5 problems. The *Tasks' list*, the *diversity of games* and the *Self-regulation* were used only in 1 problem. Regarding the results of the implementation of the strategies, all the children in study showed some progress. As well some significant improvements were seen (12), but we could not find significant differences between the two groups of children, besides being very similar both in diversity of the strategies used by the teachers and the results achieved. We notice that the registration done by the teachers are unanimous in defending that continuing the use of the strategies is important for the

children to keep their attention and to maintain these results.

4.2 Intervention in Reading Problems

The Reading Problems were identified in a group of 20 children, in 3 areas, and only 9 children showed the following problems: *text understanding* (5 children); *fluency in reading* (4) and *sequential organization* (1). These data confirm the studies of Pujol and Almeida [15], claiming that children with ADHD, due to their impulsivity and attention deficit, show a sudden and inaccurate reading, spending more time in reading the words and sentences (reading fluency), which leads to a poor understanding of the text (comprehension). These data confirm the studies of Sindelar, Lane; Pullen and Hudson [13:159] when they state that the specific strategies to be worked out with children with ADHD in this area should provide the increase of fluency in reading for the understanding of the vocabulary and the reinforcement of the comprehensive skills.

The strategies adopted by the teachers in the intervention in the same problems of the two groups are similar. In the problem of text comprehension, the most used strategy by the teachers was the *oral summary* (3), followed by the *pre-reading* (2), the *repeated reading* (2), the *teaching of new words* (2), the *feedback* (2), the *reinforcement* (2). Concerning the fluency in reading, two strategies were used by all the teachers – repeated reading (4) and spelling (4), the previous introduction of new reading and the repetition and knowledge of words were adopted only by half of the teachers.

Regarding the results of this intervention and according to the registrations of the teachers, there were academic improvements in all the interventions made and they also refer they will maintain the strategies in order to obtain better school results. However, in any of the teachers' registrations is mentioned if the child evolution was high, but it is understood that more time in the implementation of the strategies will be necessary to obtain better academic results.

4.3 Intervention in Writing Problems

As in the reading problems, the problems in writing were also identified in 9 children. However, only 3 children have problems in one of the areas, while 6 children were identified with reading and writing problems in simultaneous. We also verify that the problems in writing were seen in 2 children

with ADHD compound type, in opposition with 7 children with ADHD without an identified type. We registered, still, that there are not common problems in the two groups. Although in the group of children with ADHD without an identified problem, we verify that the following problems were common in two children: *Fear/difficulty in writing* and *Irregular Handwriting/poor* are common in two children in each group. These problems are justified by Pujol and Almeida [15:5] when they refer that in general the writing problems in these children lay in poor manual skills, revealing themselves on coordination and manual accuracy, originating irregular and disorganised handwriting beyond difficulties in those activities which require manual skills. Regarding the strategies often used by teachers were *dictations*, *copies* and *compositions*, adopted in three problems; followed by the *repeated readings* and *spelling*, the *summaries*, the *recognition and spelling of each linguistic sign*, the *formation of words and simple sentences*, the *sequential steps* and the *skills for Plastic Expressions* (Arts), adopted in two problems. In what concerns the results, teachers confirm that with the intervention every child achieve progress, but only in three children the progresses were significant.

4.4 Intervention in the Problems in Mathematics

Concerning the problems in Maths 11 children were identified. Dividing them in the two groups of children, we verify that 14 problems are from in seven children with ADHD of the compound Type and 6 problems belong to four children with ADHD without an identified subtype.

We also verify that the problems, although they are more for the ADHD compound type group, they differ only in one problem, being the others equal to the group of children without an identified subtype.

The problems with the *comprehension* of the questions affect more children (7) followed by the *resolution of the problems* (6). The problems with *multiplication table* and in the *identification of the operations* have three children in each. At last, the problem *invent the results* is only for a child with ADHD compound type. Excluding this last problem, we verify that the remaining are as the problems detected by Pujol and Almeida [15:4] defending that the comprehension of the questions for the resolution of the problems is one of the three areas with more problems in the children with ADHD. Sücürü

[20:170] adds that the problems in memorizing and remembering basic concepts are one of the problems found in these children who will be reflected in multiplication table and the resolution of the operations, our research came to the same conclusion.

In what concerns the strategies implemented during the intervention, we verify that the *Table of operative synonymous* (7 teachers) and the *short questions* (7 teachers) were the most used, gathering together the problems of the two groups. The strategies *Questioning drawings*, *Symbols ruler* and *Underline information* were adopted by five teachers each, for the problems of understanding the questions and the resolution of problems. The strategy used for the problem of multiplication table, identified in three children the teachers' choice was only *The bowling table of Multiples*.

Regarding the results of the children with the intervention, the child with ADHD compound type, with the problem of inventing the results, did not get any improvements keeping his initial situation. All the other children (10) showed some improvements, and two children with ADHD compound type had significant successes in the same problem (comprehension of the questions) and in two children with ADHD without an identified subtype in the problems of comprehension of the questions and in the resolution of problems happened the same.

4.5 Intervention in the Problems of Oral Language

In what concerns the problems of oral language, these were the less identified in children with ADHD, except for one child with ADHD compound type with the problem of *Organising ideas* and *having a sequential speech* end three children with ADHD without an identified subtype with problems with the *Sequential Speech*, *Articulation of the Words* and *Lost in dialogues*. These data are justified in scientific literature, referring that the children with ADHD in classroom context, talk when they should be quiet or simply talk of other things different from the subjects in study, beyond their own speech is less elaborated, less fluent and containing articulation deficits, comparing to the other children [8:95].

The strategies adopted in the intervention of these problems were diversified, except for the child with the problem of the sequential speech where the teacher only used the *sequential steps*.

The results obtained by the teachers showed improvements in four children, there are also significant improvements in the child with ADHD without an identified subtype who had the problem of articulation of words and a fast speech and out of context. For this child the teacher mentions that the use of the *Visual Symbols Ruler*, as *self-instruction*, was very useful for the child's progress: "through the symbols ruler he can already speak slower and does not run over words".

5 CONCLUSIONS

Concluded the analysis of the teachers' portfolio, based on the intervention done with their own children with ADHD, about their problems in the academic performance, we are going to refer the following conclusions as being the most relevant:

- (i) The twenty children with ADHD studied in this research, only one child does not present problems in his academic performance, we are aware that the learning difficulties are a reality which needs to have an urgent intervention, otherwise there will be more academic damages to these children.
- (ii) The attention problems are the most visible (18 children), which provokes deficits in doing the academic tasks and consequently lower school results because of the weak performance. The problems in Mathematics are, as well, very significant (11 children), followed by the problems in reading and writing, with 9 children each and the problems in oral language less significant (4 children).
- (iii) The intervention in the attention problems showed better results, there were significant progresses in 12 children, by showing more time spent in maintain the attention in the task or in the explanations of the teacher, which seems to be good for the academic performance.
- (iv) The teachers' intervention in the reading problems revealed some progresses although the time of its implementation was still short, when we evaluate.
- (v) In the intervention in the Mathematics problems some progress was already effective in 4 children, improving the comprehension of the questions and the resolution of maths problems.
- (vi) In the intervention of writing problems, from the results achieved by the children, we want to state the significant progress in three of them. Two of the children improved a lot their skills which led to a better handwriting.
- (vii) In the intervention of oral language problems, one in four children showed significant improvements in the articulation of words.
- (viii) The implementation of this Training Programme for the teachers was very important for their practice, not only the knowledge about ADHD they acquired, but also, about the use of appropriate strategies and materials in order to adequate their teaching methods to the problems associated to this disturb, justified by the improvements achieved in the intervention with ADHD children.

We consider that the limitation of this study it was the intervention evaluation period which it was very short (3 months). We suggest that in further researches, this time item should be increased, therefore more significant results in ADHD children can be obtained.

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