

Resiliency in Developmental Dyslexia Generated by Educational Intervention: Plasticity toward Learning Processes

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Abstract

Learning difficulties concept is frequently used in Venezuelan educational levels to describe a wide variety of characteristics that could obey to student individual differences. Undiagnosed bright dyslexic students stay behind in various levels of educational system and pass unattended, tagged as lazy or dumb, without the special care that defines this group of learners, which never arrive to Special Education attention. Qualitative research goal is to understand the singular characteristics of psycho - educational and family factors that contributed to successful evolution of a developmental dyslexic case, establish patterns in 8 similar cases; design and implement educational intervention that benefits a group of dyslexics in an integrated classroom. Literature revision is centered in dyslexia, its etiology, diagnosis, process and educational strategies of attention. As a result there is a retrospective construction of protective and risk psycho – educational and family factors that guide to successful development, as well as those aspects that contribute to describe their differential needs. Theorization takes place over reports of plasticity and learning processes, mainly on educative interventions, integrated to Shaywitz (2003) model to overcome dyslexia. On these basis there is a design and implementation of school intervention that show changes in quality of knowledge – reproductive, convergent-productive, divergent productive and evaluative knowledge- after it takes place. It is shown that intervention not only affects positively gifted students, but also less advantaged ones increases the quality of their knowledge. Conclusions are oriented to recognize plasticity towards the learning process of the dyslexic condition in terms of changes of its characteristics.

Descriptors: Dyslexia, cognitive processes, risk and protective factors, Psycho – educational intervention, integration.

Introduction

Education is a permanent social and individual process, linked with human development, and starts from the moment that a person establishes interaction with the physical and social environment. From the earliest stages of life, we are complex subjects of a world shaped by a particular culture which is carried by those around us, through different ways and

institutions (family, school, church, etc.). Even though it is a broad social event, in occidental culture, teacher is expected to contribute, through education, to enhance student learning abilities so that they are being useful to themselves and to society. These competencies are unique and differ in each exclusive case, which makes imperative educational process individual attention in the classroom. These principles stem from United Nation Educational Scientific and Cultural Organization (UNESCO) guidelines and underlie documents supporting Venezuelan national core curriculum (*Curriculo Básico Nacional, CBN*).

Currently Venezuelan children with notable differences in their learning processes coexist in the classrooms, sharing the same routines, programs and curricular activities, resulting multiple circumstances, yet treated with a degree of uniformity setting patterns and similar action for all, disregarding their cognitive and metacognitive socio-affective differences. Teaching experience points to the idea that bright students, able to get the best academic results, share the same system of those diagnosed with dyslexia, learning disabilities, or both, and apply patterns that could to be effective for some and deepen differences in others.

On this issue, there is concern on alternatives that protect and empower those whose cognitive strengths do not focus on traditional developed and evaluated skills in school. Hence stems the study of new educational approaches that focus on the concept of intelligence as multiple potentials, develop differential strengths and not only those who excel in Language and Mathematic areas, as an alternative explanation to understand the development of a case diagnosed with visual and auditory dyslexia at 8 years old, who grows to have a Master degree in Mathematics with control of two languages at the age of 24.

In this regard, elements that allowed resiliency formation - human beings capacity to transform their risk factors in protective factors for development- are pointed out and verified in 8 similar cases. Once this process is described, regarding its main characteristic, a series of actions that lead to learning are designed based on teaching strategies that could benefit both, students with similar problems as those who show no evidence of problems or whose results are outstanding.

Strategies are explored for the purposes of establishing their relevance to produce specific

learning outcomes in classroom context, under a scheme of action research, in a group of last year of Diversified Medium Education level, in a subject matter specially designed for the purpose of filling the cultural references and educational cognitive needs detected in students who begin their university studies.

On these grounds, then builds the educational intervention through an instructional design that incorporates the factors that made up resilience in the case studied. This design is implemented in an integrated classroom with two dyslexic students and four undiagnosed, but suspected to be dyslexic. The number of students is 17, ages 16 to 18.

Goals

- Identify areas favoring successful development of a case diagnosed with developmental dyslexia related to resiliency.
- Design a set of teaching strategies that promote resilience formation in students with learning difficulties and to implement them in a school group with integrated classrooms.
- Explore teaching strategies that promote resilience formation in students with and without learning difficulties.
- Proposing a line of beneficial teaching strategies for students with learning disabilities.

Characteristics of Research

The research is conducted in three stages: First, on the basis of a retrospective case study on the characteristics of psychoeducational and family intervention that led to academic achievement in a case of dyslexia development (Acedo, 2004) identifying guidelines to produce strategies for the design of an intervention plan that is applicable in an integrated school environment. To achieve this there is an analysis performed on the documents and interviews, recorded in a previous study, as well as the transcript of the History of Life, which was validated by its actors and experts in the field. The second stage is verification of presence of these evidences in 8 cases with similar development. The third stage is the design and implementation of the intervention based on qualitative method Research Action, which by definition is participatory and directly involved in the educational actuality, through a pedagogical action that seeks to change classroom reality through actions for all its participants, who in this case are students of a private Education Unit,

located in Miranda State, Venezuela, with special features central to the investigation. It directly involved the population of students enrolled in the last year of Diversified Cycle. This institution serves middle class students and is characterized by providing a personalized service that guarantees feasibility of this investigation. The unit of analysis is formed by a group of students in 17 subjects, 6 male and 11 female, who have completed at the same campus from 7th grade. Of these, two have diagnosed learning difficulties diagnosed and it is suspected that three other students might have difficulties, since they have symptoms of problems.

The investigation was adjusted to the characteristics that set for this type of research, the authors Cohen and Manion (1990) – situational, participation, association and auto evaluative- It was carried out two steps, typical of the Action Research: diagnostic and therapeutic intervention In the first, we studied the problem that occurs and is committed to the group involved in alternative solutions, in the second, was designed and implemented the intervention plan. In order to observe the shift toward resilience, we examined the assumptions by qualitatively assessing situations in classroom social life.

Techniques were document review, in depth interviews, focus group, consulting experts. Tools for analyzing the results were graphic analysis of network data and qualitative analysis of the hermeneutic matrix. Analysis was systematized using Atlas ti program.

Principles for the study

The following summarizes the basis for the school intervention, from the study of psychoeducational approach conducive to academic achievement of a case diagnosed with developmental dyslexia (Acedo, 2004). These conclusions are derived from the theoretical inferences drawn from analysis and provide the basis for the instructional design to be applied in the study group, which has several similar cases:

Resiliency

The protective factors in adulthood are greater in number and quality than the ones present in childhood or adolescence. They become of risk factors development for most observed aspects. Moreover, the quality of tasks is more robust as they are intrinsic - inseparable from the person and less dependent on the environment. This fact suggests the formation of the principle of resilience in the case studied - ability of human beings to recover from

adversity and transform adverse agents in element of encouragement and development. From study of the protective and risk factors, resilience is defined as the approaches of Maddaleno, (1995-2000) and Krauskopf (2003). Acedo (2004) describes these processes related to the unique psycho-educational aspects that contributed to resilience in the case studied: During childhood learning standards and concepts, language development and many of the intelligences (Gardner, 2000) , such as spatial intelligence, kinesthetic, musical, interpersonal, interpersonal and emphasis on the language context. In adolescence, stressed the interpersonal intelligence and kinesthetic through sporting and social development, coupled with the psycho-educational work focused on neuro-evolutive systems, especially memory and metacurricular and metacognitive processes. Finally, during adulthood, highlights metacognitive and metacurriculares aspects aimed at high-level thinking, problem solving, critical thinking and making decisions independently, using faculties developed through the relationship between neuro systems - described by Levine (2002-2003)- to produce autonomous and self-regulated learning.

It is interesting considering that most relevant educational system benefits occur in adulthood, while in childhood and adolescence their contributions are very limited, mostly learning standards and conceptual reproductive knowledge, together with socialization and coexistence. This analysis, derives a set of metacognitive strategies aimed at raising awareness of resilience and is geared to students to be aware of the strengths that have generated and are the basis of the problem to deal with knowledge. School work was centered in student cooperative groups where innovative ideas offering integrated ways of perceiving the object of study, were stimulated, also, through the promotion of creative thinking, as perceived by students with the greater difficulties.

Learning

Shaywitz (2003) has conducted research on the distinctive forms of learning in dyslexia. On this basis and interpretation of the major findings, based on the relationships that exist to achieve learning which ensured success in the development dyslexia case studied, it is concluded that, to produce learning, interaction between school, family and community is needed, where every segment of union between parts presented distinctive characteristics and changed along development. These relationships allowed access and transformation of knowledge that benefit dyslexics to produce significant learning. The distinctive aspects of

this process are:

1. Motivation to achievement.

Affection climate in academic relationship is perceived as a protective factor that facilitates the anchor on the cognitive structures to give meaning to what has been learned. Likewise, the generation of cognitive conflict with new information (Ontoria, 2000), combined with motivation to resolve it, and generates understanding. In the case studied, cognitive settlement of conflict will depend on self interests and needs. If not, there is no significant anchor and that learning occurs on a surface with very little time in the memory system.

Motivation to achieve is critical to success, as stated by Levine (2003); negative self-concept is one of the causes of effort abandonment, but at the same time, the occurrence of awareness of own capabilities and difficulties understanding through a metacognitive analysis were influential factor in perseverance, needed to perform as penetrating thinking approach Perkins (1995-2000), which is reinforced at the end of adolescence and early adulthood. Motivation caused by challenging situations and problem solving will cause academic achievement.

There is a transfer of knowledge about concepts, rules and procedures, in terms of Levine (2003), in academic areas. It shows in semantic networks construction that favors memory, coding, and awareness of procedures. In this case, it was necessary to remember the procedures in writing, when there was no time to automate. This process, carried out successfully, contributed to achievement motivation. From the standpoint of self-image, confidence and support in decision taking, expressed by the family, were recognized as essential.

2. Mediation

In the development of the learning process there are two key moments for mediation, focusing on relations with gifted peers. In both cases, these pairs had a roll of knowledge facilitators building a cognitive bridge between known and new knowledge. Primary and high school teachers are not characterized by mediation because their teaching was teacher centered and not student centered. However private tutors, when reinforcing concrete areas as mathematics, where the aim was to learn the ways of thinking of Science, formed a procedural and transferable bridge to any academic situation, in the terms described by Ontoria (2000).

Since dyslexia runs in families, the father mediation consisting in sharing learning experiences and translation of strategies that focus on consolidation and recovery were keys to access knowledge. The proximity to the parent who understands and has lived through a similar situation became an optimal factor, exceeding the contributions of Education and Psychology Science available at that moment.

Using various channels of data collection and communication since early childhood promotes learning and cognition as described by Perkins (2000). This openness to the experiential learning, through direct contact with reality, helped to minimize the blockade for information retrieval in long-term memory, through key concepts to be linked to different sensory stimuli. Likewise, to stimulate awareness through different experiences fostered development of the various intelligences, under the terms envisaged by Gardner (2000).

Implementing school strategies to reproduce these aspects at the intervention with students identified with similar problems, it was noted that they provided solutions for real problems in their academic areas. These students were invited to speak openly of their learning experience in order to understand their mental processes, share them with other students and reproduce the various steps they could point up. At that point their mediation had the characteristic of being advantaged peers.

3. Dyslexia in learning.

The first case studied was under the principles –then in vogue- of cognitive system maturation, which focuses on Piaget’s theory, as a response to any delay in reading or writing, until child’s stage was overtaken by age. This vision resulted in a delay in the recognition of the problem as such and treatment before the difficulty reading and understanding.

Thus, the attention to reading and writing problems focused on promoting strategies oriented to mature the cognitive system. However, this approach will ensure that the person studied whose cognitive processes were developed, would be bored in school and did not address the problem of communication (input and output of information) and remedial intervention for express problems. Later, during primary school, it was necessary to obtain greater collaboration and tracking learning process. However, special considerations were not always protective of the process, because awareness of the problem

by teachers was not optimal, generating some protection that did not motivate intellectual challenge.

Development of language was acquired by emphasizing phonological awareness and through a downward pattern that allowed searching for meanings, as explains Bruzual (2002) in her communicative language approach. At an early age, the fact of the preeminence of cultivated language at home and environment, reading considered as a mean of obtaining information and meaning, learning focused on the promotion of phonological awareness, coupled with appropriate meanings for every word and every sentence, were keys to develop appropriate linguistic skills focusing on understanding the relationship instead of mechanical decoding for words. In school intervention strategies like concept mapping, semantic webs and schemas followed these language skills.

Another aspect of dyslexia that will affect learning is the kind of consolidation that occurs in long-term memory. Coding system which naturally involves understanding, is affected by the speed of the task. Thus, there is a need for generation of a conceptual framework, using predictive capability of solving problems to infer this framework for understanding. Reading then becomes a permanent dialogue with the writer.

From the point of view of school strategies, these aspects are taken into account in the daily routines, systems of organizing information, use of graphic organizers such as concept maps with hierarchical structure to contribute ordering visual information. Also, when working academic reading from the logical structure of the texts, and the author's intention. Such strategies resulted in a vision on the written text that led to reading later fluently, in those cases in which this process was blocked.

4. Holistic and experiential learning.

The process of teaching-learning school in the case studied, offered few opportunities for learning through experience. This kind of cognition was through the atmosphere, fostered by family activities and contributed to ensuring access to knowledge, first meaningful and contextual and, secondly, linked with the interests and needs.

In addition to this, and as a young adult, one of the distinctive ways of learning was cooperative learning, in which all members of the group contribute to building knowledge. This form of learning is facilitated by developing strategies, as summarized by Ontoria (2000): using strategies that are not isolated content. In fact, following Perkins (2000)

approaches, every science has its own tools of thinking and its own ways to solve problems and reasoning. It draws the attention, that matter subjects related to cognitive development are never perceived as promoters of the cognitive structure. Independent learning is not achieved, in the case studied, but as a young adult, when the system begins to focus on solving problems that represented intellectual challenge. This kind of thinking is encouraged by the ability to deal with intuitive knowledge, based on the observation of context and is more related to situations other than school. Procedures underlie each of the sciences and therefore each of the subjects, complemented by collaborative learning

Intelligence.

For purposes of explaining intellectual development, it is appropriate considering Gardner's theory of multiple intelligences. Thus sets up eight intelligences that were developed through activities and encouragement from family relations and environmental issues. In this sense, school strategies are derived from the consideration of multiple intelligences, following patterns that were originally produced in the case studied and verified later in 8 other successful cases. The sense of achievement and learning generated by intellectual challenge are shared in the treatment of all intelligences and were undisputed strengths in the case studied.

Differential Cognitive Processes

In learning taxonomies, cognitive processes are achieved gradually, from the simplest to the most complex and it is recommended their education in order of increasing difficulty. Thus, the capabilities of high-level thinking, such as critical thinking, decision-making and problem solving, are achieved, in degrees and become of analysis, synthesis and evaluation as cognitive processes. However, this process was not shown in this way: simultaneous applications of complex cognitive processes without domain of the more simple processes, such as recognition of information were common. This is where the problem lies: reproductive knowledge is one of the most glaring failures, but not more advanced processes. Levine (2002) explains this process from creative thinking and the need for certain cognitive styles do not maintain the linearity of thinking. One could then infer a compensation mechanism that independences high level processes to lower level, raising new learning taxonomies to support Education.

With regard to resolving problems and penetrating thinking, part of the high-level cognitive

processes, the case studied when young adult, notes its importance for learning and for performance at workplace and follows certain steps that coincide with the definition that states Levine (2002): recognizing a problem when it is presented, anticipate the consequence of its solution, evaluate the difficulty, mobilize resources, think logically, consider different strategies and select the best, start and monitor the time of settlement, monitor the process, deal with contingencies and arrive at the right solution.

Another aspect that draws attention to differential cognitive processes is the high level of abstraction that occurs when dealing with symbols, which suggests transferable skills to understanding the world and the generation of compensatory strategies. This suggests the obvious need to alter evaluation systems to be based on the strengths and not weaknesses, allowing the expression of understanding relationships through other mechanisms other than reproducing knowledge.

Metacognition

Metacognitive processes contribute to recognition, monitoring and optimization of cognitive processes. In this sense, the process of revising mistakes was the main key to get an understanding of relationships and problem solving, by optimizing its processes through the correction of errors. Aid and support to carry out a metacognitive process is in the following terms: First, make the conscious cognitive task that is asked, secondly consider how much information about this task and how are their prior knowledge required for the assignment and, thirdly, to monitor their strategies and processes to produce improvement in automation (passage of the working memory or short-term memory to long-term) and improve strategies in similar situations.

Conclusions and Implications

Describing successful learning processes in dyslexia – first one case, verifying findings in 8 other subjects- followed by an active research to explore teaching strategies focused on generating resilience in a group of students, show that intervention was beneficial for both, students with learning disabilities and those who have never been shown to have this kind of problems. This statement is complemented with summative assessment analysis. Thus, in all evaluations applied, there was an increase in scores average, while maintaining dispersion, compared to scores averages obtained prior to implementation. This evidences that treatment is beneficial, both to more advantaged and less advantaged students and that

the learning condition is plastic towards learning, meaning it changes and is moldable when learning occurs.

Additionally, it was noted that when teaching strategies focused on control of risk factors, they become protective factors, and when applied to the extensive group of students, they become desirable thinking skills. In fact, one of the outstanding achievements is that strategies oriented to holistic and non linear thinking are beneficial, both for regular students and those with difficulties.

It was also revealed the ability of students with learning disabilities to provide creative solutions to the problems raised, this being one of its most prominent advantages. To accomplish this, it was necessary to introduce principles of systematic critical and reflective thinking to ensure their autonomy.

It is hoped, in the long term, that extensive student group apply strategies favoring cognitive processing of those students with dyslexia not only increase its autonomy in critical and reflexive thinking, but recover their interest for certain subjects, change their mental model based on learning and reproductive convergent, to be active participants in construction of knowledge; replace their reproductive practice for a productive learning in growing communities; differentiate essential content and associate new to a system of thought that allows them to act as a strategic apprentices.

Finally, and as a primary purpose of the investigation, it is hoped that, through a deliberate pedagogical action, students with learning disabilities, specifically dyslexia and through a learning process that involves metacognitive control over their core processes generate strategies that allow them to transform their risk factors into protectors, in regard to their learning abilities.

On this platform will integrate the results to develop a broader agenda that promotes cognitive and metacognitive processes of students with dyslexia and promote the processes of those students who show no evidence of difficulties. This would serve to give suggestions and recommendations to curricular design in order to perform intervention for these students in integrated environments.

It is clear that many of the aspects that contribute to forming resilience in students with learning difficulties and in turn contribute to the formation of self-government in the high-level cognitive processes in all students surveyed, can not be measured as a product of a pre

and post test, which justifies the type of intervention, but one can sense that there is a better approach to the subjects and a deeper analysis of the sources and interaction between them as well as the proper use of specialized vocabulary and the ability to understand the motives behind the facts in the various subjects, for the construction of knowledge and handling of large amounts of content that are available to students. This approach allows confirming the assertions of Eden and Lyon exposed as findings in the context of the event VI International Dyslexia Conference, organized by the British Dyslexia Association (BDA) that what is good for dyslexia in turn is good for the difficulties in learning and for any student. Furthermore, any diagnosis or intervention in dyslexia must be preceded by an adequate education.

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