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READING RATE AND FLUENCY BASED INSTRUCTION FOR CHILDREN WITH INTELLECTUAL DISABILITY: A CASE STUDIES

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ABSTRACT. We studied the effects of word fluency training on text reading rate in four students diagnosed with intellectual disability, from mild to severe. Prior and after the intervention, participants read three different texts for the age-graded level, to evaluate the effects of training on reading fluency. The independent variable was a fluency training for reading words based on Precision Teaching. During the intervention correct responses and faster rate of responding were reinforced. The results showed a significant improvement in oral text reading for all participants. Word fluency training seemed to be also efficient, requiring a brief intervention to reach important reading goals.

Keywords: *Oral Reading Fluency, Precision Teaching, Disability, Word fluency training, Fluency aims, Effectiveness, Efficiency.*

ZUSAMMENFASUNG. Wir haben die wirkung eines training von einfluss lessen von einen textin vier schuler mit einer diagnose von mittlere und schwere intellektuelle behinderung studiert. Vor und nach dem eingreif sind an den schuler drei verchindene texten unterbreitet worden, zum die auswirkung. Bewerten von dem training des fliessenden lessen eines textes. Werent dem eingreif sind fliessende und richtige antworten belohnt worden. Die ergebnise zeigen ein bedeutende verbesserung im lessen bei allen scheint wirksam. Ein kurzer eingreif hat ermoeglicht das man nein wichtiges ziel erreicht hat. Das lessen, das fliessende lessen genauigkeit teaching, behinderung lessen training einfluss woerter fliessende ziele, leistung, wirksamkeit.

Schlusselworter: *Mundelselsefluss, Praezisioni lehre, Behinderung, Unterricht fliessend, Effectiveness, Wirkungs.*

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Introduction

In 1964, Lindsley wrote: "*Children are not retarded. Only their behaviour in average environments is sometimes retarded".* In half a century after, both, regular and special education, teacher still rarely implement evidenced based teaching methods to ensure that their children's skills acquisitions is both accurate and fluent.

Since the rate of acquisition of new ability or behaviour is strictly related to environmental factors, the creation of specific instructional programs should be fundamental (Perini, 1997; Perini & Bijou, 1993). Applied research with learning-disabled students describes the sequence of prerequisite tasks and a be main tactic to build reading fluency (Casarini & Andolfi, 2015): to model fluent oral reading (Blevins, 2001; Rasinski, 2003), to provide direct instruction and feedback (NICHD, 2000; Snow et al., 1998), to offer many opportunities for practice and to provide students with plenty of materials at their independent reading level (Allington, 2000).

More aspects are related with an effective fluency based instruction. Precision Teaching (PT) was one of the most replicated fluency-based intervention packages and demonstrated a great potential for strengthening any curriculum for children with or without intellectual disability (Beck & Clement, 1991; Lindsley, 1992; Fabrizio, Pahl & Moors 2002; Cavallini, Berardo & Perini, 2008). The concept of PT rests on four founding principles: "(1) the child knows best: in the sense that a child's response to a task or learning approach is the best indicator of whether a given teaching method is working with that child; (2) Focus on observable behaviours: a practical rule that makes it possible to take accurate counts, to monitor whether a child is improving in response to the current teaching method; (3) Use frequency measures to monitor performance: PT focuses on rate, or frequency of responding, which can only be measured by using the number (or count) of correct and incorrect responses within a given timeframe; and (4) Use a standardised graphic display, standard celeration chart, to record performance measures and make in- structional decisions" (Hughes, Beverley & Whitehead, 2007).

Research shows that precision teaching can facilitate growth in reading fluency and other aspects of reading achievement (Adams, 1990; Therrien, 2004). Reading is the primary medium for the transfer of knowledge in all curriculum areas (Cawley, Miller & Carr, 1990; Tressoldi, Stella & Faggella, 2001) and indeed is a prerequisite skill required for much of what children learn in schools (Hughes, Beverley & Whitehead, 2007). If a child does not function at an average grade-level reading ability he or she will likely find it difficult to progress in most subject areas. Moreover, oral reading fluency has been shown to predict comprehension better than other direct measures of reading comprehension,

such as questioning and retelling (Fuchs, Fuchs, Hosp & Jenkins, 2001). In fact, if component skills are not fluent, moving on to tasks predicated on those skills makes learning more difficult and may ultimately lead to dysfluency in that subject (Kubina, Young & Kilwein, 2004). Reviews of the Italian reading literature (Cazzaniga, Re, Cornoldi, Poli & Tressoldi, 2005; Tressoldi, Vio, Lorusso, Facoetti & Iozzino, 2003; Riccardi, Ripamonti, Truzoli & Salvatico; 2004) point to two behaviours that most likely function as foundational skills for reading: syllable recognition and word recognition. The general notion is that if students are fluent in decoding skills, they will spend "less time and effort ... directed to recognition activities" (Gunderson, 1984, p. 267). PT represents an educational strategy for building reading flu- ency in which a student rereads syllables and/or words until meeting a criterion level (Cavallini, Berardo & Perini, 2008). There is still a general tendency to emphasize the development of physical and social skills, in the belief that children with mental retardation have very little potential for cognitive development (Cavallini et al., 2008). The correlation between fluency and reading comprehension was clearly established by a large-scale analysis of data from the National As- sessment of Educational Progress in Reading (Pinnell, Pikulski, Wixson, Campbell, Gough & Beatty, 1995). Cavallini and Perini (2009), found that, in typically developed children, promotion of sublexical component fluency does not show evidence of influencing reading as a general performance. Conversely, the automatization of word recognition positively affected text reading. The current study evaluates the efficacy and efficiency (in term of educational time) of teaching frequent words to fluent levels in 4 children with mental retardation.

Methodology

Research Objective

The objective of this study was to elaborate and investigate the benefits, in term of effectiveness and efficiency, of a fluency based reading intervention in three children with mild intellectual disability and a children with severe intellectual disability (See Table 1).

Table 1. Age, Sex and IQ score (Leiter-r, 2002) for all participants.

Participant	Age	Sex	IQ
F.	8	M	81
P.	10	F	77
L.	7	M	80
T.	14	M	57

The application in students with severe and mild intellectual disability of a fluency based intervention program structured on component of reading to achieve oral reading fluency. In this research we focused on: teaching words in isolation led to reading improvement in oral reading text.

Research variables

The dependent variable measured in this study was the number of syllables read per minute. Data probes were taken according CBM procedure (Deno, 1985): participants read three different texts for aged-graded level and mean data were recorded.

The independent variables in this study was a fluency training for reading words based on Precision Teaching (Binder et. al, 1990).

During the intervention students were motivated to increase their rate of correct responses and faster rates of responding were reinforced. Reinforcements and corrections were delivered at the end of each session (15-seconds "sprints"). Each child was informed of the daily frequency aim to reach and at the end of every sprint the researcher provided contingent informational feedback related to individual performance.

Procedure

Data were collected during one-to-one instruction throughout one hour interventions. During training sessions, participants conducted brief practice sprints (15 seconds). Each child was informed of the daily frequency aim to reach and the researcher motivated them, through verbal social approvals, to do their best on each trial and to read as fast as possible until timer sounded. Participants went through four practice sprints per worksheet and the teacher followed a specific decision protocol to take correct decisions. The protocol was based on the Morningside Teaching Model (Johnson, 2004)

Generalized reinforcers (tokens and social praise) and corrections were delivered at the end of the sprint. Reaching the daily aim was the condition to obtain the tangible reinforcement previously agreed whit the child. At the end of each sprint the teacher also gave informative feedbacks related to the performance and the number of words read. Researcher then visually dispayed on a graph the highest score for each words' reading session and showed pupils their results and progresses. The reading training for every set stopped when fluency aim (the frequency range the child needed to achieve before moving on to another task) were reached (from 90 to 120 words per minute).

To evaluate the efficacy of words-fluency training, with respect to speed improvement in age-graded text reading (i.e., observed in composite skills after practicing component skills and defined as "application"; Kubina, Young & Kilwein, 2004; Hughes et al., 2007), the participant had to read three different texts per months.

A CBM assessment procedure was then conducted every month. During the monthly assessment, children had to read three grade-appropriate texts. These readings must have been completely novel for the participants and no feedback was provided after all performances. The researcher calculated the mean of correct and incorrect syllables score and recorded the data on a graph, where the number of correct and incorrect syllables read was displayed separately.

Results

This study investigated the effectiveness and efficiency of a fluency based reading intervention in four children with intellectual disability. Each reading training set was printed on a worksheet and after training sessions, daily best performances were recorded. Figure 1 shows an example related to the performance of participant F. data are expressed as number of words read per minute. The frequency of text reading during CBM probes were recorded as number of syllables per minute, Table 2 lists the pre and post intervention evaluation. Results show improvement in text reading frequency for all participants, indicating the effectiveness of the training.

Results are similar to studies conducted with typically developed slow readers of English (Hughes, Beverley & Whitehead, 2007).

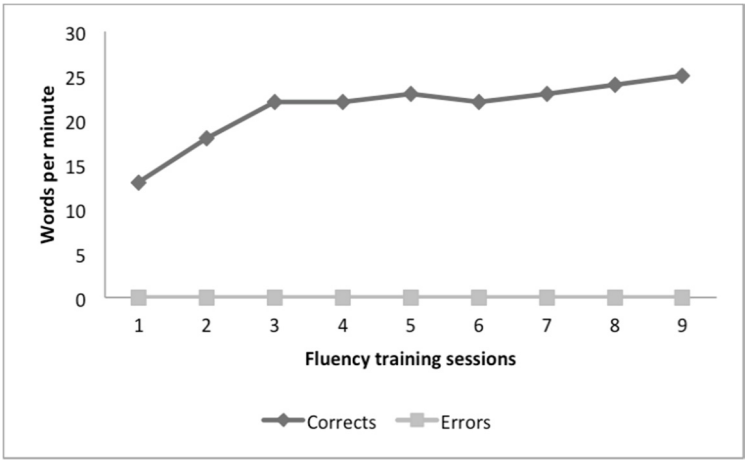

Figure 1. Performance of participant F. for a single word set

The reading improvement at the end of the seven month of training, for all participants was over 35 syllables per minute. If we consider that the mean development of reading speed for typical Italian readers is 25,2 syllables per minute in one year (Tressoldi & al., 2001), we can state that the intervention is also efficient.

The intervention lasted 7 month; lessons (about 40 minutes) took place twice a week. It's calculated summing all the drills (15 seconds) performed during the word-fluency training.

Table 2. Pre and post reading probe for all participants

Participant	Pre Probe (Syllable/min)	Post Probe (Syllable/min)	Reading improvement (Syllables/min)
F.	76	120	44
P.	84	125	41
L.	72	110	38
T.	55	92	37

Each participant was actively involved on training for 150 minutes. The total practice is the time during which participants were actively involved on task.

Fluency based instruction seems to be a useful method to improve text reading in children with intellectual disability.

One of the aims of the present study was to evaluate the extent to which fluency training in the component elements of reading (words or syllables) would promote greater improvement in age-graded text reading, an ability considered by Precision Teachers to be a composite skill (Kubina, Young & Kilwein 2004). If we consider the effects correlated with an increase in reading speed, such as text comprehension (Fuchs & Fuchs, 1986; Nathan & Stanovich, 1991), it appears evident that precision teaching used in association with a word-recognition curriculum can represent an effective intervention instrument for teachers and educators. The use of brief practice sprints, constant monitoring of results, and the promotion of a sense of fun during repetitive practice (sprints) offers a new effective way to exercise many instrumental abilities that are typically considered to be "boring", but are crucial to achieving academic goals.

Despite the present study's limitations (small number of participants, no control group, no multiple baseline measurements), the data gathered and the results raise interesting issues.

More research could also be conducted to compare or integrate word fluency instruction with different kind of intervention and to investigate comprehension outcomes. Reading "Self pace" response rhythms, brief practice

sprints, performance aims, informative feedbacks, graphic display are some of the aspects related with the acquisition of a fluent performance (Binder, 1996; Lindsley, 1996; Binder & al., 1990; Kessissoglou &Farrel, 1995; Lindsley, 1992; Koorland e al., 1990, Locke e Latham, 1990; White, 2000; West & al, 1990; White, 1986). Isolating the main component that makes fluency training an effective method is complex (Doughty, Chase e O'Shields, 2004; Kuhn e Stahl 2003; Singer-Dudek e Greer, 2005; Hanratty e Greer, 2000). Findings are ambiguous but examinating clinical effects we can support other researchers' statement related to fluency based instruction as an efficient way to train many instrumental abilities even with students with intellectual disability (Heward, 2003; Carnine, 1976).

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