PRESCHOOL READING AND WRITING: LITERACY AND PREDICTORS

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Introduction

The present paper project attempts to enter a new "value" to the Pre-primary education, in relation to learning processes of basic reading and writing skills.

Numerous studies, including those of Ferreiro and Teberosky (1985), show that reading and writing learning process is done slowly, in children aged 3 years and older, through a process of review and restatement of the language code made by the child on the basis of the environmental stress surrounding him. Chaney (1992) states that many preschoolers show the presence of a *Rudimentary Awareness*. Consequently, they are able to recognize rhymes and alliterations, thus owning a certain level of phonological awareness level. This skill is developed further, if it is enhanced properly. Therefore, the act of learning to read and to write is constituted as a natural, cognitive process, defined *Emergent Literacy* or Emerging Literacy, in which the child formulates hypotheses regarding red and written material, which are compared time after time to the linguistic stress coming from the adult context and are measured according to this context. Consequently, possible "learning predictors" are needed to be identified to facilitate learning process and to prevent potential learning disabilities. In particular, this research arises two objectives. On one hand, it is intended to check that children attending pre-primary school aged 4 and 5 years, fulfil prerequisites to acquire basic Italian language skills and to face learning successfully (Hypothesis 1); on the other hand, the research aims to analyse whether enhancement activities (*training of prerequisites*) are effective in increasing basic language skills, especially those of people having low performance profiles (Hypothesis 2).

Since some studies show the existence of a positive correlation between literacy level and economic growth measured in terms of Gross Domestic Product (GDP), by highlighting how the literacy affects economic

productivity, it is really needed to intervene on basic reading and writing skills, in order to give a "depth change" to the various spheres of human life, so that men may learn to perceive the knowledge (reading and writing) as an essential tool for individual and collective growth.

Method

1. *Participants*

270 pupils were involved in the research (M = 144; W = 126) aged 4 (N = 113; 42%) and 5 years (N = 157; 58%), attending Didactic Direction "G. Bagnera (56%) and Comprehensive Institute (Upper Secondary Schooling)" Tommaso Aiello "- Puglisi District (44%). All participants were randomly divided into one Experimental Group (GS), subjected to experimental treatment, and another Control Group (GC) was not subjected to treatment.

Tools, materials and procedure

Survey has been divided into four phases: the first phase (pre-test) was aimed at measuring reading and writing skills of persons already having these input skills; the second phase consisted of a 40 hours training action, set up in collaboration with the Uciim (Italian Catholic Union of Teachers, Managers, educators and trainers), addressed to teachers participating in the research and aimed at understanding evolutionary theories about learning prerequisites development; the third phase (treatment) saw only the involvement of GS persons into the laboratories of phonology and metaphonology designed for the purpose of this research; the third phase (post-test) provided a second measurement session of reading and writing skills towards all persons participating in GS and GC.

Reading and writing skills were evaluated individually, in a single session, both in pre-test and post-test as well, using two screening batteries, specifically *Battery of Tests for Language and Basic Numerical Skills* (ALN - Caci and D'Amico 2013) and the *Battery SR 4-5* (Zanetti and Miazza 2002). ALN Battery collects many of the tests aimed at measuring, by mean of 15 subtests, different basic language, numerical and graphomotor skills that literature and recent research have identified as school learning prerequisites (Bull and Scerif 2001; D'Amico and Guarnera 2005; D'Amico and Passolunghi 2009). In particular, for this purpose, 9 tests were administered, aimed at measuring following basic

language skills : lexical amplitude (Vocabulary Test); Access to alphabetical lexicon (test for letter Names); visual discrimination and spatial discrimination of graphemes (Letters Spatial Orientation Test); global phonological awareness, by mean of Rhyme recognition test and phonemic Recognition (initial syllable) test; auditory discrimination by words and non-words Couples test; analytical phonological awareness, through Syllabic blending and Syllabic segmentation tests. A test of Pre graphism was also administered concerning hatching and copying letters in block capitals. Battery SR 4-5 explores the construct of "school readiness" (*School Readiness*), which is the set of socio-emotional and cognitive skills that the child should possess before attending Primary School; tests aimed at measuring basic linguistic, lexical and phonological skills were administered.

Experimental treatment consisted of implementing a phonological and metaphonological laboratory within the school, from March to November 2016, by the teachers who took part in training activities. Laboratory activities were integrated within the curricular educational teaching. Specifically, next activities were made: searching rhyming words exercises; strengthening visual analysis exercises; analysis and synthesis of sounds making up the word; identification and discrimination of the initial and final part of words with the support of images; reading rhymes; tongue-twisters to increase linguistic fluency; phonetic bingo, phonemic segmentation and blending to recognize the name written in different characters; graphomotricity

2. Results

Validation Hypothesis 1 - Possession of reading and writing prerequisites in preschool children

A series of multivariate analysis of variance (MANOVA) on the scores obtained by participants in ALN Battery and SR 4-5 Battery considering GENDER, AGE and the GROUP (GS and GC) such factors between-subject, were carried out to validate the hypothesis 1 and to analyze the evolutionary differences in having basic linguistic prerequisites in children aged 4 and 5 years, attending pre-primary school (Hypothesis 1). Results show a statistically significant effect of GENDER variable on scores obtained only and exclusively in Rhymes test. Specifically, regarding pre-test, males commit more errors than females (M: M = 5,69,

DS = 2,9; W: M = 4,38, DS = 3,02; $F_{(1-268)}$= 12,5; p <.001). Vice versa, a number of differences is arisen, statistically significant, between scores obtained by participants in relation to AGE variable. Input four-years-old perform a larger number of errors than children of five years in the following tests: Vocabulary (4 years: M = 16,49; DS = 4,577; 5 years: M = 13,96; DS = 5,516 $F_{(1-268)}$= 15,830; *p*<.001); Pre graphism - Copying letters (4 years: M = 3,88; DS = 1,928; 5 years M = 2,78; DS = 5,633 $F_{(1-268)}$= 3,917; *p = <.05*); Designation of letters- Accuracy (4 years: M = 142,50; DS = 64,451; 5 years: M = 133,57; DS = 64,549 $F_{(1-268)}$= 6,511, *p<.05*); letters spatial Orientation (4 years: M=5,02; DS= 2,835; 5 years M=3,94; DS= 2,551 $F_{(1-268)}$=10,752; *p<.001*), phonemic Recognition (4 years: M= 8,66; DS=3,856; 5 years: M=6,96; DS=4,264 $F_{(1-268)}$=11,415; *p<.001*); Segmentation (4 years: M = 11,14, DS = 6,938; 5 years: M = 8,38; DS = 6,634 $F_{(1-268)}$= 10,890, *p<.001*) and Couples of words (4 years: M = 19,07; DS = 9,435; 5 years: M = 15,85, DS = 10,003 $F_{(1-268)}$= 2,941; *p<.01*). However, as far as GROUP variable is concerned, no differences statistically significant emerge, with the exception of the scores obtained at Vocabulary test in which GC has a higher score compared to GS (GS- M=14,51. DS = 5,7; GC = 16,41; DS= 3,9; $F_{(1-268)}$= 5,6; *p* <.05). Therefore, both of two groups, experimental and control one, can be considered comparable and well-treated in terms of input linguistic skills possessed.

Validation Hypothesis 2 - effectiveness of phonological training to increase prerequisites of reading and writing in preschool children

In order to validate the hypothesis 2 and to measure the effectiveness of the treatment, a series of multivariate analysis of variance with repeated measures, with two levels of the factor *called between-subject* GROUP (GS and GC) and two levels of the factor *called within-subject* TIME (Pre-test and post-test) were carried out and conducted on linguistic skills scores obtained from all participants in both ALN Battery and SR 4-5 Battery. Results of multivariate test showed a main effect of factor called *between-subject* GROUP (P <.001) and factor called *within-subject* TIME (p <.001). Likewise, a TIMExGroup interaction effect it emerges which turns out to be statistically significant (p <.001). In relation to the interaction effect named TEMPOxGROUP, data obtained from univariate tests showed statistical significance on the scores obtained by persons into the following tests: Pre graphism - Copying letters (p

<.05); Designation of letters - Accuracy (p<.001); Designation of letters - Speed (p<.001); letters spatial Orientation (p<.01); Phonemic recognition (p<.001); Couple of words and non-words (p<.05). In all tests, results indicate a better performance by the persons belonging to GS compared with those in the GC.

Measuring the effectiveness of treatment according to the age of participants

In order to analyze the effectiveness of treatment depending on the age of participants, a series of multivariate analysis of variance with repeated measures, with two levels of factor called *between-subject* AGE (4 years and 5 years) and two levels of factor called *within-subject* TIME (Pre-test and post-test) were carried out and were conducted on language skills scores obtained by participants in both ALN and SR 4-5 Batteries. Multivariate test results showed a main effect of factor called *between - subject* AGE (p<.003, of factor called *within-subject* TIME (p<.000) and a TIMExAGE interaction effect (p<.013) that turns out to be statistically significant. A high statistical significance is emerged in univariate tests for the factor called *between subject* AGE in the scores obtained from the 4-year pupils, who carry out a greater number of errors in pre-test and post-test as well, compared to that of 5-year pupils, in tests of ALN Battery and exactly : Vocabulary (p<.01); Pre graphism - Copying of letters (p<.001); Designation of letters - Accuracy (p<.001); Designation of letters - Time (p<.05); letters spatial Orientation (p<.001); Syllabic blending (p<.01); Syllabic segmentation (p<.001); Couple of words and non-words (p<.013). Any statistical significance is not shown for the measures investigated by the Battery SR 4/5 years. Regarding the variable called *within-subject* TIME, a high statistical significance is shown (p <.001) in all the scores obtained by pupils in tests of ALN Battery and Battery SR 4/5. In relation to the TIMExAGE interaction effect, results show differences in performance obtained by pupils of 4 years are statistically significant compared to the 5-year pupils on these tests, measured by ALN Battery: Pre graphism - Copying letters (p<.001); letters spatial Orientation (p<.05); Rhymes (p<.01); Phonemic recognition (p<.01). Regarding Battery SR, only a trend towards statistical significance in the scores obtained by students regarding language skills test is emerged (p <.05). Specifically, in relation to tests of Pre graphism - Copying letters and spatial orientation letters, children of both ages (4 and 5 years) show a significant improvement in the post-test, compared to the pre-test. However, in both tests, children aged 4

years improve more in post-tests than children of 5 years. Vice versa, in relation with Rhymes and phonemic recognition tests, children aged 5 years show a clear improvement in the post-test, committing fewer errors than children of 4 years.

3. *Measuring the effectiveness of treatment in the group of children 4 years*

In order to identify more specifically those performance differences due to the age of participants, further models 2X2 repeated measures factorial with two levels of the factor *called between-subjects* Group (GS and GC) and two levels of the factor *called within-subjects* TIME (Pre-test and post-test) separately in both of two groups of pupils were made.
In the group of pupils being 4 years old, results of multivariate test, performed on the scores obtained by children, showed a main effect of the factor called *within-subject* TIME ($p<.001$) and an effect of the factor called *between - subject* GROUP ($p <.001$); moreover, a TIMExGROUP interaction effect emerges highly significant ($p<.001$). Concerning univariate tests, a high statistical significance is shown in the factor called *between-subject* GROUP for measures relating to ALN Battery, specifically: Pre graphism-Copying letters ($p<.001$); Designation of letters - Accuracy ($p<.000$); Designation of letters - Speed ($p<.000$); letters spatial Orientation ($p<.025$); Phonemic recognition ($p<.001$); Syllabic segmentation ($p<.006$); Couple of words and non-words ($p<.033$). In relation with measures investigated by Battery SR 4/5 years, a high statistical significance is shown with respect to Linguistic Skills test ($p<.000$); and Phonological Skills ($p <.005$). Compared to the TIME variable, there is a high significance ($p<.000$) in all measures investigated by both ALN Battery as well as Battery SR 4/5. In relation to the TIMExGROUP interaction effect,, a tendency towards statistical significance is seen only in scores obtained by students of 4 years in ALN battery tests, listed below: Designation of letters-Accuracy ($p<.000$); Designation of letters - Speed ($p<.009$). Any statistical significance is not shown in Battery SR Concerning statistically significant variables, note that performance of GS 4-year-old children improved considerably in the post-test, due to the treatment effect.

Measuring the effectiveness of treatment in the group of 5-year-old children

In the group of 5-year-old children, a high statistical significance for the factor called *between -subject* GROUP is emerged in all measures relating to skills investigated by ALN Battery. No statistical significance compared to the measured skills is shown for the measures investigated by Battery SR 4/5 years old. Compared to TIME variable, there is a high statistical significance ($p<.000$) in all measures investigated by both ALN Battery as well as Battery SR 4/5. In relation to TIMExGROUP interaction effect, note that a high statistical significance is shown in the following measures, investigated by ALN Battery: Vocabulary ($p<.05$); Pre graphism - Copying letters ($p<.01$); Designation of letters - Accuracy ($p<.001$); Designation of letters - Speed ($p<.01$); letters spatial Orientation ($p<.05$); Rhymes ($p<.05$). A certain significance is shown in Battery SR, only for scores regarding Phonological Abilities scale ($p<.01$). Again, the results show that the 5 years old children belonging to GS improve performance at the post-test, reducing considerably the number of errors compared to the controls in all significant measures.

Conclusions

Results obtained confirm both experimental hypothesis. Specifically, concerning Hypothesis 1, data obtained allow to determinate the linguistic skills mainly present in the two age groups considered, by highlighting that the oral language, an essential element of the language, is already developed in pre-school age. Furthermore, both children 4 as well as those five years, have a certain number of errors in copying letters. Consequently, it is shown that children around 4 years old, seem to be very skilled at doing copying operations, but note that one will be consolidated in later years. Likewise, note that designation skills begin to develop itself from 4 years old, but it calls into question the alphabetic principle, according to which there is a systematic relationship between letters and sounds (Bishop and Adams, 1990). Similarly, data obtained show that the ability to recognize letters according to their spatial orientation is present in both age groups, but with different levels of performance. It is possible, in fact, to discern a greater number of errors in the performance of 4 years old children. It shows how preschool children develop these skills just by interacting with the environment and with the opportunity to observe and manipulate figurative material

associated with graphemes, words, etc. It is essential to know that development and automation of such skills is a prerequisite to get to discriminate lowercase letters, morphologically identical (p, b, q, d) or very similar ones (a, e) and which differ only from the orientation and directionality. Results of tests measuring phonological, comprehensive and analytical awareness show that, contrary to popular belief, 4 years old children are already aware of the fact that words are made up of sounds (phonemes) and that these can be manipulated and organized to create new words, known and unknown.

Regarding hypothesis 2, it may well say that if a specific treatment to enhance learning prerequisites is proposed, in addition to curricular educational teaching, to a group of children, persons will show a better development than the development of the other children who are not subjected to the same treatment. Data show a statistically significant increase in almost all the considered language skills. Introducing activities into curricular activities such the stories, experienced games and recitations, have been expanding successfully the magnitude of vocabulary, seen as an essential element of preschool language. Meanwhile, actions such cut, tear, paste are activities that have been facilitating not only the development of fine motor skills, but also the strengthening of muscles involved in the handle of the graphical tool, by improving the skills of pre-graphism, preliminary activities to writing acquisition. Using rhymes and songs, integrated with a series of recreational activities such as union or elimination of phonemes, forming of words known and /or unknown, detection of vowels/ initial or final consonant improved phonological memory skills, as well as memory at short term containing information referred to sounds (Baddeley 1986) that allows the child to repeat the alphabet, letters, words and no words of increasing length, short or long sentences. An effective phonological storage capacity, in fact, is emerging as a basic requirement for the decoding process, need to learn to read and to write in compulsory education. To recognize and to discriminate similarities and differences between the shapes, to distinguish a visual meaning between figure and background, to recognize the characteristics of a shape when changing its size, to remember a visual stimulus in its spatial location, to recall sequences of stimuli in the right sequence, to create mental images, to manipulate them with the mind and operate, in the processing visual, with a certain number of visual inputs, have been facilitating the abilities

of visual recognition of phonemes orientated in different way into the space, etc.
As a whole, data obtained in this thesis project emphasize how important is the screening in pre-primary school and how important is the design and the implementation of activities aimed at achieving intentional and effective educational-teaching interventions aimed at stimulating basic linguistic skills.

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