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Vocabulary and reading comprehension of Primary Education students in Chile

Vocabulario y comprensión lectora en escolares chilenos de primer ciclo básico

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Abstract

Reading comprehension involves different skills that make it a complex cognitive activity. The objective of this research was to know the level Chilean students reached regarding vocabulary and reading comprehension, and to analyze the correlation between these two variables. Through a descriptive, correlational and cross-sectional designed study, a total of 206 2nd and 4th grade students were evaluated using standardized and validated tests for Chilean population. The children were from three schools of different socioeconomic levels. The results reveal the levels of development achieved by these students in reading comprehension and vocabulary, as well as the variables that can be considered predictive for reading performance. The data indicates that the lexicon development, educational level and type of school have a significant impact on reading.

Resumen

La comprensión lectora involucra diferentes habilidades que la convierten en una actividad cognitiva compleja. El objetivo de esta investigación fue conocer el nivel que los escolares chilenos de primer ciclo de enseñanza básica alcanzaban en vocabulario y comprensión lectora, y analizar la correlación entre ambas variables. Mediante un estudio de diseño descriptivo, correlacional y transversal, fueron evaluados por medio de test estandarizados y validados con población chilena, un total de 206 escolares de 2º y 4º básico. Los niños pertenecían a tres colegios de diferente nivel socioeconómico. Los resultados revelan cuáles son los niveles de desarrollo alcanzados por estos escolares en comprensión lectora y en vocabulario, así como las variables que pueden considerarse explicativas del rendimiento lector. Los datos señalan que el desarrollo léxico, el nivel escolar y el tipo de centro tienen una incidencia significativa en la lectura.

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Introduction

Teaching reading is a main objective in primary education and one of the most pressing challenges for teachers. Nevertheless, a great deal of research and many international reports draw attention to the shortcomings of students in this field. Therefore, Goswami (2011) believes that such problems are common in children and estimates that between 3% and 10% of them have difficulties. Likewise, the PISA (Programme for International Student Assessment) report 2016 proved that approximately 20% of students of OECD (Organisation for Economic Co-operation and Development) countries lack the minimum basic reading skills (OECD, 2016).

In Chile, the SIMCE (Education Quality Measurement System, as per its Spanish acronym) tests has been showing the low level of reading comprehension of primary education students year after year, although the results obtained in 2016 showed a slight pick-up.in this sense. The school attended (private, state-funded, state) by the students also seems to be a determining factor (SIMCE, 2016).

Reading is therefore a matter of real concern and its importance in the school context is obvious. In this sense, on reviewing the bibliography, a proliferation of specific studies on reading has been found. Such interest in analysing the potential factors that condition the reading process is not new. More specifically, different studies have sufficiently documented the role played by vocabulary in reading and comprehension skills. Good vocabulary knowledge promotes learning and also enhances reading comprehension (Hirsch, 2007).

Most of these studies conclude that those children who do not know the meaning of certain words shall probably be bad readers. Knowledge of underlying vocabulary strengthens the link between reading comprehension and reading of words (Nation & Snowling, 1998). Studies on lexical knowledge have repeatedly shown that the problems found when processing words are the best discriminator of good and bad readers, as novice readers and bad readers show poor skills in terms of word analysis.

Hart & Risley (2003) advocate for a substantially greater effort to promote vocabulary development, especially in the early years of primary school, in order to enable students to attain high academic achievements. Therefore, there is a need for greater involvement of teachers in this task, because express vocabulary teaching would enhance those linguistic skills related to the reading and writing processes (Cuetos, 2009).

Muter, Hulme, Snowling & Stevenson (2004) found that reading comprehension is consistently predicted by those word recognition skills and vocabulary acquired previously. Likewise, in their study, Suárez, Moreno & Godoy (2010) found a marked correlation between vocabulary level and reading comprehension. A direct relationship between the processes liked to comprehension and the child's quantity and the quality of words is admitted (Cepeda, Granada & Pomes, 2014). Perfetti (1985) believed vocabulary is the best predictor of comprehension in early school age, although text comprehension is also conditioned by other variables and cognitive processes (Cain, Oakhill y Bryant, 2004; Morales, 2011).

In this sense, Ricketts, Nation & Bishop (2007) studied what reading skills are related to vocabulary and found that vocabulary predicts reading comprehension, although it does not predict all reading skills. Like other researchers (Muter *et al.*, 2004; Nation & Snowling, 2004), they suggest that individual vocabulary differences play an important role in some aspects of reading but they do not do so in other aspects. Nevertheless, they point out that the child's vocabulary richness may limit text comprehension when a text includes words that the child does not know. In fact, children with comprehension difficulties may show difficulties at this level (Canet, Burin, Andrés & Urquijo, 2013).

Other studies have also verified that vocabulary and the socio-economic level contribute the most to the development of reading comprehension, which also confirms that predictors do not act alone but interrelated (Fonseca *et al.*, 2014; Morales, 2011; Perfetti, 1992; Urquijo, García & Fernandes, 2015). In this sense, Jiménez & García (2007), in their study that was led throughout two different countries with Spanish-speaking students, revelled a positive correlation between the level of reading comprehension of the students and their families' socio-economic level.

In view of the foregoing, one could say that, regardless of the context, the results of the research are related to current theories about the role played by vocabulary -as well as other skills: phonological, grammatical- in the development of early reading, strictly speaking, one cannot speak of a theory of reading because reading has too many components to develop one only theory (Perfetti & Stafura, 2014). Nevertheless, some studies have shown that the correlation between vocabulary development and comprehension is not always as significant as expected (Muter *et al.*, 2004; Salvador, Gallego & Mieres, 2007).

From this point of view and based on the disparity among different studies, the researcher should keep analysing the variables that could be predict and/or condition the reading process, in order to design and develop specific programmes aimed at improving the students' reading skills. For this reason, we intend to study the knowledge of vocabulary and the level of reading comprehension among Chilean students of second and fourth year of primary education, in order to analyse the relationship between both of them and how they behave depending on gender, school level (year) and type of educational establishment.

In this sense, the following question was asked: What is the relationship between vocabulary and reading comprehension among Chilean students of first cycle of primary education? The following hypothesis was accordingly contemplated, this being: the vocabulary of students of first cycle of primary education is closely related to reading comprehension.

Method

This is a non-experimental, transversal-type study, where an ex-post-facto methodology was used to describe and analyse the relationship between variables in a specific educational reality, in its natural context, with a predictive intention (Hernández, Fernández & Baptista, 2010).

Participants

A purposive sample made up of three different schools from Iquique (Chile) were selected[1]: one private school (parental fees paid), one state-funded school (receives funding from the state) and one state school (local school) attended by children with different socio-economic levels (SEL). According to the data provided by the Education Quality Agency (SIMCE, 2016) the schools were attended by students of a high, medium and medium-low levels, respectively. Initially, 218 students from first cycle of primary education were assessed. Those students with physical, psychical or sensory impairments were excluded from the study; therefore, the final sample included 206 students, distributed as detailed in table 1.

Variables

Three types of variables were taken into account to conceive this research: independent

Table 1.

Overall sample

	Year 2			Year 2			Total
School	Girls	Boys	Total	Girls	Boys	Total	
Private	26	17	43	26	22	48	91
Subsidised	17	14	31	17	12	29	60
City	9	15	24	14	17	31	55
Totals	52	46	98	57	51	108	206

attributive (year, gender, establishment type), independent variable (vocabulary) and dependent variable (reading comprehension)

Vocabulary is understood as the set of words that make up our language and that is used or can be used by students to communicate (Salvador *et al.*, 2007).

Reading comprehension refers to the student's ability to understand a text's explicit and implicit information, as well as his/her ability to build a situational level with using insight and consistently with the ideas outlined, and with the reader's own knowledge (Van-Dijk & Kintsch, 1983).

Instruments

The data were obtained using the following measurement instruments, validated in Chile:

1) Reading Comprehension Test of Progressive Linguistic Complexity (Alliende, Condemarín & Milicic, 2012), which assesses general reading comprehension using sentences and texts. It is presented in 8 reading levels and each level has increasing difficulty from the linguistic point of view, which simultaneously involves increasing difficulty from the point of view of reading comprehension. Each level corresponds to one school level. In this research, the tests corresponding to year 2 and 4 were selected. The test of each level is made up one subtest of increasing difficulty. This activity consists on reading quietly and answering multiple-choice questions. Each correct answers scores 1 point, being 28 points the maximum score for second year and 18 points for fourth year.
2) TEVI–R test of vocabulary is based on using pictures (Echeverría, Herrera & Segure, 2002), which measures the level of passive vocabulary of an individual and which can be applied to children aged between 2.5 and 17. The activity to be carried out by each child consists on specifying one of the four pictures presented in each sheet, which is linked to the word-stimulus that has been expressed by the interviewer. The test is "managed on a one-to-one bases to children under 8; it can be applied extensively to older children" (Echeverría *et al.*, 2002, p. 8). Each student is classified in a rating scale based on the obtained score (outstanding, very good, fair, mild or severe retardation).

Proceeding

The data were collected in a period that was comprised between the months of June and July 2016. The headmasters of each school were firstly contacted, the objectives and the characteristics of the research were explained to them as soon as they were invited to participate. The headmasters asked the teachers of Spanish Language of the levels that were involved to know if they could have been interested.

Upon agreeing the dates and the schedule when tests were to be administered, the students took them in the classroom for three weeks, during the first two sections of their school day. Six senior students of Psycho-Pedagogy who were in their training period, had previously administered the vocabulary tests to each one of the students of Second Year and collectively to the rest of the students. The reading comprehension test was supervised by the teachers of the subject, with the support of these training students of Psycho-Pedagogy. Before these tests were overseen, one of their questions was previously explained as a way of example in order to make sure that the proceeding had been understood.

All the students who accepted to participate in the project did it voluntarily and they had finally obtained the consent of their parents.

Statistical analysis

The distributions by frequency and percentages for the case of the category variables were obtained and significant links among them were detected. Therefore, the scores that were obtained in the vocabulary test, were later

classified in categories to group the students. In this way, Chi-square ($\chi 2$) was used to test the hypothesis of equality of results distribution by gender, year and school, to determine the contrast in equability of results distribution by gender within the framework of each year and school, and also to analyse the differences by school within the framework of each year.

In the case of direct scores, the mean and the standard deviation of the variables is described. In order to analyse the significance of the differences in the averages by gender and year, the Student's t-distribution was used for both homogeneous and heterogeneous samples, according to the results of Levene's test, and using Bootstrapping in the case on abnormal samples. The Brown-Forsythe test was used to compare the averages of the schools and of the years, because the data normality principle was not observed. Welch's test was applied when normality was found, but not homogeneity.

In last place, the link between vocabulary and reading comprehension is described using a bivariate correlation, and a multivariate analysis of linear regression was conducted to analyse the overall link between the score obtained in the vocabulary test and the percentage score in the reading comprehension test, adjusted by gender, year and school.

The analysis was performed using the IBM SPSS v.19 software, with a significance level of 5%.

Results

Reading literacy

Globally (table 2), the analysis showed first cycle students have an average in reading comprehension of 65.18 (*DT*=24.00), with significant differences (Brown-Forsythe (1.176) = 7.583; $p<.01$) in favour of second year students. Nevertheless, if one takes gender and school into account, the students showed significant differences (Brown-Forsythe (2 y 167.08)=16.23, $p<.001$) in the success rate of the different schools, the lowest values being obtained in the city and the subsidised school compared to the private school. Greater dispersion is found in these referred schools, with standards deviations of 25 and 22, while variability was lower among those students of the private school. No significant difference were found between boys and girls (t (204)=-0.19, p=.834).

Table 2.

Overall results in terms of reading comprehension by gender, year, school and cycle

	N	Average	Standard Deviation	95% confidence Upper	95% confidence Lower	p-value
Gender						
Boys	97	65.53	24.22	60.98	70.31	.834[a]
Girls	109	64.88	23.91	60.29	69.05	
Level						
Year 2	98	70.01	27.15	64.44	75.08	.007[b]
Year 4	108	60.80	19.86	56.97	64.74	
School						
Private	91	74.40	20.07	70.24	78.30	16.23***
Subsidised	60	62.87	25.26	56.52	69.51	
City	55	52.45	22.44	46.72	58.84	
Cycle						
Year 2 and 4	206	65.18	24.00	61.87	68.56	

[a] T-student for homogeneous samples, adjusted by the Bootstrap method for abnormal samples
[b] Brown-Forsythe for abnormal samples
*** p<.001

If one takes the year into account, depending on gender and type of school, the averages obtained by second year boys and girls is similar, as there are no significant differences between both of them ($t(96)=-0.14$, $p=.882$). The same occurs in Year 4, where no significant differences by gender were found (t (106)=-0.15, $p=.886$). Nevertheless, significant differences were found between schools in both years; the students from the private school obtained a higher success rate, followed by those from the subsidised and the city school. In second year, a significant difference between the students from the private school and the city school was found (Brown-Forsythe (2 and 73.37)=4.6., $p<.05$). A significant difference was also found among fourth year students from both schools (Brown-Forsythe (2 and 97.19)=16.93, $p<.001$).

Vocabulary

The global results (table 3) show an average of 43.02 (*DT*=11.02), with significant differences (Brown-Forsythe (3 and 391.51)=20.97, $p<.001$) in the scores in favour of the fourth year students vs. those of the second year. The analyses did not proof any significant differences between boys and girls ($t(204)=-0.3$, $p=.773$) depending on gender and type of educational establishment, or between schools (Brown-Forsythe (2 and 183.84)=1.01, $p=.368$).

If one takes the year into account, depending on gender and school, no significant differences were found between boys and girls from Year 2 ($t(96)=-1.55$, $p=.398$), or Year 4 ($t(106)=1.19$, $p=.263$). Additionally, the results showed the absence of any significant differences between schools in both years (Year 2, w(2 and 54.39)=2.27, $p=.113$; Year 4, w(2 y 66.33)=1.17, $p=.846$). Nevertheless, it should be appreciated that the second year students from the state-subsidised school that obtained the lowest average score, while those from the private school obtained the highest average score. The score of the fourth year students was around 46 in all three schools.

If one takes the overall sample (table 4) into account, no significant differences were found either depending on gender and school between boys and girls ($\chi^2(4)=3.723$, $p=.445$), or between schools ($\chi^2(8)=11.067$, $p=.198$); a very similar percentage of students within the "outstanding" category (around 5%) is found, such category including a lower number of students from the

Tabla 3.

Overall results in terms of vocabulary by gender, year, school and cycle

	N	Average	Standard Deviation	95% confidence Upper	Lower	p-value
Gender						
Boys	97	42.78	11.19	40.44	45.04	.773
Girls	109	43.24	10.90	41.20	45.17	
Level						
Year 2	98	39.98	11.31	37.81	42.30	20.97***
4º	108	45.79	10.02	43.96	74.69	
School						
Private	91	44.20	11.90	41.70	46.64	.368[b]
Subsidised	60	41.82	9,12	39.46	44.10	
City	55	42.40	11.38	39.43	45.39	
Cycle						
Year 2 and 4	206	43.02	11.02	41.61	44.56	

[a] T-student for homogeneous samples, adjusted by the Bootstrap method for abnormal samples
[b] Brown-Forsythe for abnormal samples
*** p<.001

state-subsidised school, which obtained a higher percentage of students with mild retardation. It was also found that around 41% of the students had mild retardation and around 5% fell within the "outstanding" category. Nevertheless, a higher percentage of students with severe retardation was found in the second year (28.6%) rather than in the fourth year (10.2%). A slightly higher percentage in the fourth year was found in the other categories (very good, fair and mil retardation). A greater number of students fell within both levels in the "mild retardation" category. It is surprising that almost 70% of the second year students and more that 50% of the fourth year students performed so badly ($\chi^2(4)=13.963$, $p<.05$).

It should be noted that more than 50% of the girls and 33% of the boys from Year 4 had mild retardation. 40% of the girls from Year 2 had mil retardation, compared to 41% of the boys. As far as the school is concerned, it was found that in the second year students who came from the state-subsidised school had the highest percentage of mild retardation, while in the fourth year students from the state-subsidised school had the highest percentage.

Link between the vocabulary variable and reading comprehension

If one takes the overall sample (first cycle), no significant correlation between vocabulary and reading comprehension was found, depending on gender or school ($\rho=.14$, $p>.05$). Nevertheless, when the results are broken down by year, a significant link among Year 2 students was found; the higher the score obtained in the vocabulary test was, the higher the success percentage was ($\rho=0.29$, $p<.05$). A significant link was also found in the second year, in the case of boys ($\rho=.38$, $p<.05$), while the students of the same year from the state-subsidised school showed a significant correlation ($\rho=.51$, $p<.05$). No significant correlation was found among the girls, either in the private or the public school (table 5). The results obtained by the fourth year students showed a significant correlation between the scores obtained in vocabulary and reading comprehension among the girls ($\rho=.30$, $p<.05$).

In last place, in order to obtain specific results, the results were presented using the comprehension multivariate regression model for the "reading comprehension" variable (table 6), adjusted by gender, year and school. Among

Table 4.

Distribution of the students according to the vocabulary test

	Outstanding		Very good		Fair		Mild retardation		Retardation severe		p-value
	N	%	N	%	N	%	N	%	N	%	
Level											
Year 2	4	4.1	5	5.1	21	21.4	40	40.8	28	28.6	
Year 4	6	5.6	14	13.0	31	28.7	46	42.6	11	10.2	
1st cycle											
Year 2 and 4	10	4.9	19	9.2	52	25.2	86	41.7	39	18.9	
Gender											
Boys	4	4.1	8	8.2	30	30.9	36	37.1	19	19.6	.445[a]
Girls	6	5.5	11	10.1	22	20.2	50	45.9	20	18.3	
School											
Private	5	5.5	14	15.4	21	23.1	37	40.7	14	15.4	
Subsidised	1	1.7	2	3.3	17	28.3	28	46.7	12	20.0	.198[b]
City	4	7.3	3	5.5	14	25.5	21	38.2	13	23.6	

[a]Pearson chi-square
[b]Exact Pearson chi-square

the variables that were used, these being the year, the vocabulary and the type of school were statistically significant and can thus be seem as influencing variables of reading comprehension, even if to different degrees. The variable "gender" was not linked to comprehension in any way. In particular, the adjusted average difference among the second and the fourth year students was 15.5 ($t(199)=4.37$, $p<.001$), the highest success percentage among the second year students. By schools, the students from the private school obtained higher percentages than the students from the city school with an adjusted difference of 17.38, while the differences between the students from the state-subsidised school and the public school had increased to 8.22 points. It was found that a one percentage point increase in the TEVI-R test has an impact of 0.4% in reading comprehension.

Table 5.

Correlations between vocabulary and reading comprehension

	N	Correlation[a]	p-value
		Year 2	
Gender			
Boys	46	.38	.009
Girls	52	.19	.185
School			
Private	43	.26	.097
Subsidised	31	.51	.003
City	24	.08	.71
		Year 4	
Género			
Boys	51	.02	.906
Girls	57	.30	.021
School			
Private	48	.14	.36
Subsidised	29	.11	.565
City	31	.33	.074
		1st cycle	
Género			
Boys	97	.09	.405
Girls	109	.16	.103
School			
Private	91	.12	.271
Subsidised	60	.18	.162
City	55	.09	.537
		Totals	
Year 2	98	.29	.004
Year 4	108	.17	.08
1st cycle			
Year 2 and 4	206	.14	.054

[a]Spearman's Rho

Table 6

Results of the comprehension multivariate regression model

						95% confidence	
Variables	Estimation (β)	Standard error	g.l.	t	p-value	Upper limit	Upper limit
Boy vs. Girl	2.45	3.01	199	0.81	.417	-3.48	8.37
Year 2 vs. Year 4	15.55	3.56	199	4.37	<.001	8.53	22.57
TEVI-R Punt. Total	0.40	0.14	199	2.81	.005	0.12	0.67
Private vs. City	17.38	4.00	199	4.34	<.001	9.49	25.27
Subsidised vs. City	8.22	4.09	199	2.01	.046	0.16	16.27

Discussion

The objective of this study is analysing the link between vocabulary and reading comprehension and its behaviour depending on gender, school level and type of school in the first cycle educational establishments in Chile, in order to provide an answer to the research question. Initially, it was found that the second year students have a significant better level of reading comprehension than the fourth year students, without any significant differences in terms of gender. This discovery is surprising

and was already noted by Hirsch (2007), who stated that most students can succeed when they face the first levels using simple texts, but they have difficulties to face study texts of a more advanced level.

Nevertheless, both in the second and fourth year case, there are significant differences depending on the type of school. The private school students obtained better grades in both levels. In our study, the type of school had a significant impact on reading comprehension, but this fact cannot only be attributed to the students high SEL, as it has been stated in other reports where this variable turned out to be a determining factor (Fonseca *et al.*, 2014; Jiménez & García, 2007; Morales, 2011; Suárez *et al.*, 2010; Urquijo *et al.*, 2015), as the socio-economic conditions be very different and include variables that have not covered in the study. In any case, the low scores obtained in reading comprehension are not new and it is a constant in the drafted reports to that end (National Assessment of Educational Progress [NAEP], 2000; OECD, 2016).

As far as vocabulary is concerned, it was found that the fourth year students have a significantly broader vocabulary than the second year students. This has been a fact that had already been shown in previous studies (Hart & Risley, 2003; Pavez, Rojas, Rojas & Zambra, 2016; Suárez *et al.*, 2010; White, Graves & Slater, 1990).

No significant differences depending on gender were found either. In fact, the "gender" variable plays a secondary role in the reading comprehension development (Morales, 2011). Nevertheless, although children have seamless access to vocabulary in their language, they may have difficulties to understand texts due to their deficit in other superior linguistic skills and also because they lack vocabulary (Canet *et al.*, 2013)

The lack of vocabulary is evidenced in the students of the sample, and it is significantly more stated in the second year students rather than in the fourth students. This seems to be in line with the Vieiro & Amboage contributions (2015), who found that a low level of vocabulary does not necessarily mean that the reading level is low. An appropriate progress in vocabulary as the school level rises was found, and no significant differences between the schools analysed were found.

If we take the overall sample into account and do not bear gender or the type of school in mind, the data obtained in the correlational analysis showed that the link between vocabulary and reading comprehension is not significant. This achievement matches those from other previous studies, where the correlation between vocabulary and reading comprehension was not what it had been expected (Muter *et al.*, 2004; Salvador *et al.*, 2007). Nevertheless, the data proved a significant link between both variables in the second year students, among the second year boys and among the fourth year girls. Additionally, significant differences were found at the public school in the second year. These results partially question the hypothesis that vocabulary is the most determining factor of reading in the early years (Perfetti, 1985), although they match the results of many studies that state vocabulary is a relevant predictor of reading competency (Hirsch, 2007; Morales, 2011; Protopapas, Mouzaki, Sideridis, Kotsolakou & Simos, 2013; Suárez *et al.*, 2010; Verhoeven & Perfetti, 2011).

To sum up, the results of the study show that vocabulary, the school level and the type of educational establishment have an impact on reading performance, even if to different degrees. Nevertheless, if we bear in mind the fact that gender was not a determining factor in any case and that the other variables are far more relevant, the link could be attributed to other causes.

In this sense, the data obtained should be construed cautiously and their scope cannot ignore the fact that the sample has a local nature

and that the study was only applied to students of two different levels. But these findings support the need for further research regarding other variables (such as the link between oral language and reading comprehension) in this context and in the near future, as well as regarding other conditioning factors (such as the link between certain teaching methods and reading comprehension) that may have an impact on the students' reading performance, in order to conceive and implement programmes that meet the needs of these students and promote better performance in reading activities.

Notes

1. In Chile, city schools are owned and funded by the government and managed by the municipalities of that country. State-subsidised schools are owned and managed by those private institutions that receive some money from the government and supplemented by fees that are paid by the families. Private schools are those kind of establishments that are owned, managed and funded by individuals and the students' families.

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