Recent assessments of literacy and numeracy and their proxies, in Latin America: some highlights

Juan E. Froemel
UNESCO-Santiago-OREALC, Latin American Laboratory for Evaluation of Quality in Education.
Las Nieves 3313. Apt. 602.
6682109, Santiago, Chile
jfroemel@entelchile.net

Measurement and assessment connected with Education in Latin America although is not old it has been rather abundant, if solely national studies are considered. Notwithstanding, if international comparative evaluations are accounted for, the balance does not rise significantly. In fact, although the first international achievement study, involving at least one country from the region (Chile), took place in the beginning of the Seventies, in the very early stage of the IEA studies, only in the late Eighties other Latin American countries chose to become involved in such evaluations. Moreover, if one turns the attention to the Literacy and Numeracy assessments in the region, their presence is even more scarce.

The purpose of this presentation is to make an account of the latter efforts, that is of studies oriented at assessing Literacy and/or Numeracy in the Latin American region, comprising those countries located in North, Central or South America and The Caribbean, being of Spanish or Portuguese origin. It will also elaborate on each of these studies, chiefly describing their basic characteristics, pointing at some of their strengths and weaknesses and finally summarizing its main conclusions. A brief comment will be made at the end of the presentation, not on this abstract, about studies oriented towards assessments of achievement in formal education, in which the variables measured can be taken as proxies for Literacy and/or Numeracy. Nevertheless, due to the fact that the latter studies are more education oriented, no in depth analysis will be presented in their case.

The regional situation.

Three studies can be mentioned as more or less authentic expressions of the assessment of Literacy and/or Numeracy proper which have included countries from the region. It is nevertheless necessary to highlight at this point, that the construct of Literacy considered here corresponds to Functional Literacy vis a vis earlier and more nominal concepts of it. In this respect, it is interesting to point-out that those three cases involved measuring both Literacy and Numeracy. Another peculiarity is that the three studies considered increasing relative levels of aggregation in which to test the subjects and issue their results. The Study of Basic Competencies in the City of Rio de Janeiro, was carried-out in 1996 and 1997. It was focused on two cities (as separate and independent populations) as its sampling universe: Rio de Janeiro and Campinas. A second study, was implemented starting in 1995 and it was a regional research project on Functional Literacy and Numeracy in seven countries (Argentina, Brazil, Chile, Colombia, Mexico, Paraguay and Venezuela), coordinated by the UNESCO Regional Office of Education, located in Santiago de Chile. Finally, one country from the Region, Chile, was part of the International Adult Literacy Survey (IALS) and its data were collected in 1998. Furthermore, three more countries (Bolivia, Costa Rica and Mexico) and one state (Nuevo Leon from Mexico), are to be part of the Adult Literacy and Life Skills Survey (ALL) on its Second Wave of countries, to be fielded in 2004. As it can be seen, in the region one study has already been performed at the city and country level, one at the country and regional level and one at the country and international level of aggregation.

The Study on Basic Competencies in the City of Rio de Janeiro.

      This survey was performed in two cities of Brazil, Rio de Janeiro and Campinas. In the former it was coordinated by the Institute for Studies of Culture and Continuing Education (IEC) and in the latter by the Center for Studies of Education and Society (CEDES). It included subjects within the 15 to 55 age range. Data from 1,347 individuals were reported in Rio de Janeiro and 1,198 in Campinas. Sampling was stratified by socioeconomic level and selected in two steps.

      Three domains were measured during a house interview, namely: proficiency in reading Prose and Poetry, proficiency in reading Documents and Quantitative proficiency, all with independent instruments. All three instruments, including both multiple choice and open ended items, were based upon the basic literacy competencies developed by ETS and applied on the National Adult Literacy Survey in the USA, in 1992. Although parameters were estimated and scales were built using IRT models (no information is available whether Rasch, two or three parameter models were used) through a linear transformation, results were reported on a 0 to 1,000 point scale, with a mean of 500 and a Standard Deviation of 100 points. Three "anchor levels" were generated in order to interpret the results, placed at the 400, 500 and 600 point levels. Specific requirements had to fulfilled by anchor items in order to be considered as such. Items were aimed at differentiating three different schooling levels: up to 4 years of education; between 4 and 8 years and; secondary or higher education. Each person took 27 items in all (9 from each domain) from a total of 107 items, arranged on a block design. Two associated factor questionnaires were also applied. One dealt with housing conditions, occupation, school level and wages of those living in the house. The other was aimed at collecting information on parents' education, habits and daily activities and continuing education participation as well, of each interviewee.

      In terms of its strong features, the study relied on a sound and valid sampling design at the city level of aggregation. The item-analysis methods as well as the scale generation procedures, were sound and up to date. The instruments were based upon an extensively tested model for both Literacy and Numeracy and the related questionnaires addressing the key factors effecting the three domains tested were also supported by an ample breadth of relevant research literature. One of the few weaknesses deal, first with the limitations due to the sample, mainly its urban connotation as well as the fact that it represents only two regions of the country, which is far away from granting support to any generalization at such a level. It is not only that the two settings are cities, leaving the rural reality out, but also that Brazil's wide diversity is way more complex than those national characteristics these cities might be able to capture. Another issue worth mentioning is the fact that the inclusion of multiple choice items tends to introduce a rigidity element in the instruments, considering the complex nature of the constructs being measured.

      In agreement with many other studies, such as IALS, this study showed small gender effects in Prose and large in the Quantitative scale, favoring males. Similar effects were found for Whites and Orientals as compared with Blacks and Hispanics, being larger in the Quantitative scale and smaller in the Prose and Document ones. Mixed outcomes were evident in terms of age, where slight differences in favor of young adults against those over 50, showed up in Prose and Document and the opposite was evident in the Quantitative scale. Nevertheless, a surprising finding related to the education level was that in both, Prose and Quantitative scales, those persons with 4 years of schooling did better than those with 8 years of formal education. No particular explanation could be found for this. Management level and professional occupations showed, as customary, a high and positive degree of relationship with all proficiency domain measurements. Also a high and direct relationship was found between proficiencies and both average monthly household income and average annual income of heads of household. Furthermore, general conclusions indicate that in Brazil there is a lag between the updating of basic competencies of the adult population and the demands of the local work market. This is especially true in the case of women's quantitative proficiency and both prose and quantitative skills for Blacks and Hispanics. Also, it was confirmed

that there is a positive relationship between years of formal education and levels of proficiency and that a rather long school experience is necessary in order to develop lasting basic skills. In other respect, only 20% of the population appears to be over the 600 level, which is the highest "anchor" echelon, in all three scales.

The regional research project on Functional Literacy and Numeracy.
This project was carried-out in seven countries in the region. Although the target sample size was 1,000 subjects per country, the actual final figures were the following: Argentina (961), Brazil (1,000), Chile (833), Colombia (1,000), Mexico (1,701), Paraguay (1,000) and Venezuela (1,200). Multi-stage stratified sampling was used in all countries, although no common sampling procedure was enforced, neither is there information about the extent to which for this purpose random methods were employed. The study was focused on adults of ages 15 to 54, with some variation in Paraguay (15 to 34), all of them living in urban areas from which the top socio-economic status echelon was excluded by design.

The institutions in charge in each country were of a wide variety. While in Argentina, Chile, Mexico and Venezuela State agencies were in charge, in Brazil and Colombia this role was played by NGOs. The overall coordination was in the hands of the UNESCO Regional Office for Education in Latin America and The Caribbean. As its authors posed it, two methodological approaches were implemented. One was quantitative including the application of a 36 item test to every examinee, split into a first core or screening section and a main section. Items corresponding to three domains were administered jointly, 12 belonging to Prose, 10 to Document and 14 to Mathematics. A personal or individual data questionnaire was then applied to obtain information about labor and social competencies, via a self-report instrument. This latter approach was complemented by another described as qualitative, being its methodological structure largely discretional in each country, although the most prevailing tool used was that of the structured interview type. Consequently, these latter data are extremely difficult to compare and even more to generalize. All instruments were part of a home survey.

In terms of item analysis, scale construction, structuring of levels of proficiency and subject ability determination, the BILOG program was used. Four proficiency levels, based on distribution quartiles could be distinguished in all countries, except in Venezuela, where only three validly emerged. The procedures for item elimination were not consistent across countries and considering that the sampling schemes were neither common, two countries were excluded from the regional comparisons, those being Argentina and Paraguay. A nine point scale was built, ranging from -4 to +4 points on which the scores were expressed and from which the country means were calculated.

Among the strengths of the study, it can be pointed-out that it was the first regional Literacy and Numeracy study in the region, thus eliciting information that never before had been issued. Another strong point is the fact that IRT methods were used, so granting the study a level of support that allows for more reliable comparisons and inferences. Among the weak points, two have to be mentioned. First, the tests of proficiency could not be applied across all countries due to the fact that some items did not perform well in all of them. This situation did not allow for comprehensive cross-country comparisons but only among five of them. The second issue dealt with the fact that sampling procedures were not necessarily equivalent in all countries, thus further reducing the comparability of results among them.

Highlights from the across-country comparisons indicate that, in general, there is a decreasing trend from scores in the Document scale to the Quantitative Scale, leaving Prose in the middle. Although results in Mathematics were fairly similar across countries, the lowest end was marked by Venezuela. Chile was last in Document and next-to- last in Prose, while Brazil was last in Document. Colombia showed the best performance, both in Prose and in Document. The most

highly correlated variable with all proficiencies showed to be years of schooling. There is no clear pattern in what respects to the relationship between type of work and proficiencies. The case is that for low skills workers there is a clear correspondence with the two lowest proficiency levels, although a clear relationship is not evident for high skills workers.   Age is not in general a significant factor over proficiency in any of the scales. The location of the school is a variable that has influence over proficiency particularly in Prose, where most of those having attended rural schools are restricted to the lowest level of proficiency.   A general conclusion drawn deals with the fact that several levels of proficiency in Literacy can be distinguished among adults in the countries included in the study, but those levels are not homogeneous but conditioned by context variables.

The participation of Chile in the International Adult Literacy Survey (IALS).

Chile was part of the International Adult Literacy Survey involving twenty two countries in total. The actual final sample size was 3, 502 person in the 16-65 years age range. The institution in charge of the Survey in the country, as sub-contractor of the Ministries of Labor, Economy, Education and Planning and other state entities as well, was the University of Chile.

Literacy (functional) was defined as "Skills for understanding and using printed information in daily activities in the home, the community and the workplace". A battery of items, arranged on an Incomplete Balanced Block Design, was applied to each individual as part of a household survey. These blocks were preceded by a Background Questionnaire including socio-demographic and labor information and a core set of items for screening purposes. Three domains in all were assessed, namely Prose, Document and Quantitative and four levels were defined and established for each domain. All items were of the open-ended short-answer type. Item analysis, scaling and ability scoring were based upon the three parameter Item Response Model. The resulting scale ranged from 0 to 500 points.

Among the strengths of the study, it can be pointed-out that it was the most thorough and comprehensive survey on functional literacy up to now in the region. A second issue stems from the fact that its conceptual and theoretical foundations are deep and wide encompassing, constituting one of the key contributions to the definitions of Literacy existing today. Third, the quality and advancement of methods used for item and inferential analysis, as well, were optimal. Among the few weaknesses that can be pointed-out, stands the intuitively evident presence of cultural biases in some the items, although item curves did not elicit any bias whatsoever

Highlights for Chile, out of the across country comparisons indicate that, in general, there is a large, relative as well as absolute deficit in the skill scores with respect to the industrialized countries (in fact there were negative differences with most other countries in the Study). In particular, it is noteworthy that between 50 and 57% of the Chilean adult population belonged in Level 1.   It was also evident that the low scores were more prevalent in older than in younger cohorts. Finally, the Survey shows that there was a very strong correlation (maybe higher than in all other countries) between level of education and level of competencies.

REFERENCES

Bravo, D. and Contreras D. *Competencias Básicas de la Población Adulta.* Santiago de Chile, Universidad de Chile, 2001.

Infante, M. *Alfabetismo Funcional en Siete Países de América Latina.* Santiago de Chile, UNESCO-Santiago, 2000.

Santos Fontanive, M. and Klein R. Competencias Básicas das Populacoes Jovem e Adulta da Cidade do Rio de Janeiro. *Contemporaneidade e Educacao,* IV, 5, 46-77, 99.