

# **A COMPARISON OF ASPECTS OF PRIMARY SCHOOLS IN REDE ESTADUAL AND REDE MUNICIPAL IN BELO HORIZONTE, MINAS GERAIS**

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In this paper I explore the different characteristics of the Rede Municipal and Rede Estadual systems in Belo Horizonte, Minas Gerais, and attempt to determine which of them explains the greater cost effectiveness of the Rede Municipal system. Student, teacher and school facilities and school principal characteristics are analyzed.

In order to evaluate student achievement in the fourth grade in public schools in Minas Gerais, a survey was carried out in 1999, which gathered data about children, their families, schools, classrooms, teachers, school directors, and community relations.<sup>1</sup> This is part of a four nation study, carried out in Argentina, Brazil, Chile and Mexico. The studies had a core of common questions, and, in the case of Brazil, additional information was gathered about the self-identified color of teachers and students, as well as more detailed information about some categories of data. The surveys included 24 schools in each nation; in Brazil, the 602 students in the survey attended 12 schools in each school network.

There are striking differences in the cost per point of student achievement according to the network in which the school is found. Achievement is measured by the average of the student's scores on the fourth grade UNESCO tests of language and mathematics. The cost per student in the REDE ESTADUAL was \$203 less than that of the REDE MUNICIPAL; students in the REDE ESTADUAL had an average achievement of 1.33 points greater than that of those in the REDE MUNICIPAL after allowing for achievement attributed to socioeconomic condition, so that it saved \$153 dollars per point for students to attend the more effective REDE ESTADUAL. However, the dummy variable for membership in the REDE ESTADUAL is significant only at .17 in explaining student achievement. This relatively low level of significance may reflect the small sample size of 24 schools, 12 from each REDE. Nonetheless, the REDE ESTADUAL provided enough of an advantage to raise the question of why it did better than the REDE MUNICIPAL, and to examine these REDES to determine which factors accounted for the significant differences in their impact on student achievement. The factors involved relate largely to the management of the school, rather than to the school's physical conditions and equipment;

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the cost of the shift in management style and teacher behavior from that associated with the REDE MUNICIPAL to that of the REDE ESTADUAL is not estimated in this paper.

We examined the explanation of student achievement for these factors singly, combined in an index, and in estimates that included a variable for membership in network. In future studies we hope to learn why the behavior of these variables such as differs between the Municipal School network and the State school network. For example, in the Municipal School network teacher absence where it is high; in the State school network, teacher absence is low.

We start by acknowledging that there is a great difference in the factors that influence student achievement in reading and student achievement in mathematics. The former is highly dependent on the socioeconomic condition of the student's family, while the latter is significantly influenced by school level characteristics. For school level characteristics, we examine the average achievement of each school class. The average reading score of students on the UNESCO exam in Municipal Schools network is 17.84, compared to 18.29 for the reading score of students in the State School network. In the case of mathematics, the average score of students in the Municipal School network on the UNESCO exam is 23.86, while that of the students in the State School network is 24.88.<sup>2</sup> The difference in result in student achievement between the two school networks is significant only in the case of mathematics. We examine those characteristics that explain mathematics outcomes with that have the greatest difference in significance between the two networks.

In our analysis, there are two levels that impact student performance: characteristics of the child and his or her family; and characteristics of the school. We begin by analyzing the impact of child socioeconomic status (NSE) and school network on mathematics performance. The socioeconomic indicator explains 34.9 percent of student outcomes. There is a slight improvement by adding the school network to the analysis. Taken together, these two variables explain some 39.6 percent of student achievement in mathematics: the socioeconomic status indicator explains two and a half times as much as the school network (membership in the State network) of an average child's performance. The socioeconomic indicator is significant at the .001 level, and the school network is significant at the .114 level. As there are only 24 schools in the sample, we believe that this level of significance is high enough to warrant further exploration.

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<sup>2</sup> When we divide the results according to the children (not all classes are of equal size), we find that the mean for reading is 17.95 and 18.33, and that for mathematics is 23.91 and 25.06, for in the Municipal and State schools, respectively.

The socio-cultural index for students in the Municipal School network (1.82) is higher than that for students in the State school network (1.50), and this difference is significant at .003. . Although students in the Municipal School Network have a higher socioeconomic condition indicator than children in the State School Network, there is greater variance in socioeconomic condition of children in the Municipal School Network: the standard deviation of NSE is significantly and negatively related to student achievement.

Despite the higher socio-cultural index of students in the Municipal School network, the student achievement in the Municipal School network is lower than that in the State School network. The peer group effect of average socioeconomic status (CNSE) slightly improves the test scores for mathematics of students: as the peer group socioeconomic status index increases, the performance of an average student increases.

An examination of several school level variables indicates that on average, fewer school principals in the Municipal School network have an administrative credential than those in the State School network. They have fewer hours of training this year, and have had less special training in school administration. They have about 60 percent more years of experience as a teacher and as a director in their current school. Of these variables, the differences in training in school administration, years of experience as a teacher, and years of experience in the school where the director is currently serving are significant.

My colleague Maria Ligia de Oliveira Barbosa suggested categorizing variables into those emphasizing academic functions, and those that are more related to relations to the parent and community. The academic functions are developing the academic agenda, selecting books, selecting teaching materials, evaluating students, encouraging their improvement, and supporting teachers. Dra. Barbosa suggests that a school director's disciplining students is part of creating a positive academic atmosphere. This is consistent with literature on the subject. However, in practice, when directors in our survey state that they emphasize discipline, student achievement in their schools is lower than when they do not. Apparently in this small survey, when school principals emphasize discipline it is because an orderly academic atmosphere has not been obtained.

The directors' functions that are related to the community and parents are: relating to the community, sponsoring community events, relating to parents, and relating to public officials. Examining directors' functioning with regard to how they differ among the school networks, we find that Municipal School principals emphasize academic functions somewhat less frequently than do State school directors, and within this group of functions, emphasize discipline more. The

statistical relationship between emphasizing discipline and achievement is negative. There is significant difference between State school directors' emphasis on supporting teachers, which they do more often, and discipline, which they do less often than their Municipal school counterparts. There is no difference in their emphasis on selecting teaching materials, and the differences in the frequency with which they emphasize other functions: academically oriented functions barely misses significance for difference between the networks.

When the directors' community related functions are examined, we find that the State school principals consistently emphasize community related functions of relating to the community, developing community events, relating to parents, and relating to public officials. However, the difference is only significant for relating to the community; other tests indicate that emphasizing relating to public officials has a negative relation to student mathematics achievement. When the value added by schools, after allowing for socioeconomic status was analyzed in an earlier paper, it was found that the two significant determinants of achievement were the school directors' views that lack of parent participation was an obstacle to student achievement and the number of total siblings, as well as membership in the Municipal School Network. This is consistent with the notion both that insufficient attention to community affairs is strongly negative in its impact, and that when directors emphasize the community lack of participation as a reason for poor student achievement, it may be an excuse for not carrying out other functions that might have a beneficial impact.

The behavior of teachers in the Municipal School network is appalling. They are better educated than those in the State school network, and are as likely to have a teaching credential. However, they are absent 8.5 days per year compared to .82 days; have other jobs in addition to their main teaching jobs twice as often, and once in school, only spend 68% as much time actually teaching. Tested individually, among these variables only the difference in time absent between the Municipal and State school network teachers is statistically significant.

Once in the classroom and actually teaching, there could be differences in the methods used by teachers in the two networks. The schools have significant impacts on mathematics achievement, but socioeconomic conditions of the students determine virtually all of language achievement. We therefore examined the impact on average class mathematics score of mathematics questions to affirm knowledge, questions to individual students, questions to find what was known, questions open to the whole class, and questions asked for variety. Teachers in the Municipal Network directed questions to individuals more often than in State schools. The relation between this and math score is negative but not significant. The amount that questions varied had no relation to the student achievement in mathematics.

In the case of mathematics, although teacher giving the correct answer significantly impacts the mathematics score for all the students, when we examine the difference between classes of students in the two networks, there is no significant difference for this variable. However, when we examine the content of exams, we find that the State school network has significantly more emphasis on problems than on numerical solutions.

The importance of teachers' absence in explaining student achievement leads us to examine the determinants of their absence. Teachers are absent more often if the director has not been in the school for a long time, and does not emphasize developing relations with the community. However, the original coding used may have been divided into groups that were too small. After recoding so that values above the mean are coded as "1" for director years, teacher absent, and years the director served as teacher, and those below as "0", and recoding director functions as "always" equals "1" and others = "0", we find the following characteristics are close to significant in explaining mathematics achievement: positive—years that the director has served in the same school, and supporting the teacher; negative is emphasis on relations with public officials. Combining these into a "good directors index" explains 11.6 percent of the variance in students' mathematics achievement. Adding teacher absence to this explains 19.4 percent of the variance.<sup>3</sup>

We next turn to teacher's credentials and behavior. There is no significant difference between school networks in teachers' credentials; teachers in the REDE MUNICIPAL direct questions to individuals more often; those in REDE ESTADUAL have more variety in the questions they ask and places more emphasis on problems than straightforward calculations. Adding these variables individually, or combined into an index, does not improve the explanation of students' mathematics achievement.

The outstanding variables in explaining the difference in effectiveness of the Municipal and State school networks' capacity to have their students learn mathematics are directors who have been in the school for a long time, who emphasize support of their teachers, and do not frequently spend time on developing relations with public officials.

Teachers' credentials and teaching techniques do not vary significantly between the networks. Teachers' absences do, and the greater dissatisfaction of teachers with the Municipal Network's Escola Plural than with the lesser dissatisfaction of the State Network's teachers with the Pro-Qualidade program may well contribute to the explanation of greater teacher absences.

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<sup>3</sup> Additional reasons for teacher absence are explored by Bernadete da Silva Ribeiro Batista: "Um estudo das representações docentes sobre os impactos da reforma educative no município de Belo Horizonte e do estado de Minas Gerais." Mestrado em Sociologia/FAFICH/UFMG, janeiro de 2002.

The complaints over the Municipal School network's inadequate implementation of its program are said to indicate that the program itself may not be poor: if this is the case, then there is something seriously wrong in its implementation that should be examined. A summary quantitative estimate of the combined impact of the variables that differed most mentioned in this paper and the physical conditions in the school is given a "good school index" that includes specified school conditions, the teacher having the correct answer, director functions, and the presence in a classroom of an adequate blackboard. The "good school index" for the Municipal Schools was .08 compared to .42 for State schools. The overall difference between the two systems, which would include the variables that do not differ significantly between the school systems, would be lower.

We are left with the Aristotelian thought that even if the Municipal School's Escola Plural is a good idea, to this date, the problems stemming from implementing this program outweigh any benefits it may convey, at least as far as teaching mathematics goes. And we have already noted that schooling, at the margin, has little impact on reading, so that we have no opinion about the differential ability of these programs to aid students' acquisition of basic literacy.