



OBSERVING PUBLIC EDUCATION IN PUERTO RICO

Executive Summary of the First Report
of the Observatory of Public Education
in Puerto Rico

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Researchers:

Dr. José Caraballo Cueto
Associate Professor, School of Business Administration
Director, Census Information Center
University of Puerto Rico, Cayey Campus

Dr. Héctor Cordero Guzmán
Professor
Marxe School of Public and International Affairs
Baruch College, City University of New York

Dr. Indira Luciano Montalvo
Associate Professor, Department of Economics
University of Puerto Rico, Río Piedras Campus

Dr. César Rey Hernández
Full Professor, Graduate School of Public Administration
University of Puerto Rico, Río Piedras Campus

Dr. Eileen Segarra Alméstica
Full Professor, Department of Economics
Researcher, CEMGAP
University of Puerto Rico, Río Piedras Campus

Research Assistants:

Antonio Gil de Rubio Cruz
Carlos Gonzáles Cofiño
Jesús Tirado Garay
Glorimar Torres Posso

Translation into the English Language:

Orlando González Rivera

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Introduction

The purpose of the Observatory of Public Education in Puerto Rico is to foster studies that allow us to better recognize the country and the education system in particular, in a more scientific manner, and thus contribute to the understanding of our reality in a more objective way to provoke possible solutions in the future. During this year, The Observatory was conceived as a think on education matters. It started in mid-2019 due to the concern and the financial support of PR Philanthropy (Filantropía PR in Spanish, previously known as Foundations Network of Puerto Rico, Red de Fundaciones de Puerto Rico in Spanish). It is ascribed to the Center of Multidisciplinary Studies of Government and Public Affairs (Centro de Estudios Multidisciplinarios de Gobierno y Asuntos Públicos, CEMGAP, in Spanish) of the University of Puerto Rico.

At the Observatory, we develop research to shed light on the current status of education in Puerto Rico and to work as a source of information to design public policy to transform and improve the education system of Puerto Rico. This report shows the results of five research works performed during our first year. The objective of the studies presented in this first report is to emphasize the broad questions that will offer us an overview of the education system and provide data to foster public policy decision making based on objective figures and information.

The report includes five studies. In this executive summary, there is a description, findings, and recommendations of each study. Dr. César Rey Hernández performed the first study. It evaluates the education reform enforced through Law 85, in particular the charter schools. The second study belongs to Dr. Héctor Cordero-Guzmán. It focuses on identifying the dimensions of school dropout in Puerto Rico, documenting the changes observed since 2010, and analyzing some labor causes and consequences due to school dropout. The third study, by Dr. Eileen Segarra Alméstica, examined the sociodemographic, community, and school factors affecting academic performance. In the fourth study, Dr. Indira Luciano Montalvo researches the relation between socioeconomic segregation and educational segregation in Puerto Rico. Finally, in the fifth study, Dr. José Caraballo Cueto measured the effect of schools closing on the academic performance of students forced to relocate.

Study # 1: The educational reform: the charter schools paradigm in the face of poverty and violence in Puerto Rico.

Description of Study #1

The purpose of this study is to analyze the education reform pursuant to Law 85 and in particular with respect to the charter schools variable. Its framework was the socioeconomic context of children and youngsters, the social environment in which our youngsters develop, and the role of education as a key to the future of our country. Understanding the formulation of public policy of the law was one of the objectives of our work.

The study focused on the only two existing charter schools and their potential of becoming a model to be followed, given their possible success. The work also presented the historical context of the two organic laws in Puerto Rico as a framework of this study.

New York, California, and Louisiana are necessary references due to the similarities in educational contexts and experiences. We made an in-depth study of poverty and marginalization of students, as well as the violence on which the social project of public policies is based. The intention is to reveal possible paths to formulate educational policies given the challenge to adequately manage one of the most sophisticated and substantial budgets in the government of Puerto Rico.

This work has been the only exploratory study performed in Puerto Rico on the two education laws (Law # 149, Law # 85) that have directed the educational reform during the last twenty years in our school system. Within the social and socioeconomic context of education in Puerto Rico, public policy changes have been examined, emphasizing the charter schools' model, a cornerstone of Law # 85 of the last education reform and a point of much debate in the country. The history and ideology that gave origin to the reform were discussed from a critical and comparative perspective. Hence, this model's potential and limitations to change the country's education system are analyzed.

Different **conundrums** have guided this effort. First, we asked ourselves if the Charter School model, spearhead of the discussion, and Law 85, could become a potential model for our system. Hence, other conundrums came up:

- **When did these changes in the country's educational public policy come about, and what was their content?**
- **What is the ideology underlying these education policies?**
- **What is the socioeconomic situation of the island and the students?**
- **What is the role of poverty in education in our country?**
- **What is a charter school all about?**
- **What are educational vouchers all about?**
- **How did these models work in different jurisdictions of the United States?**

The discussion about the education literature in the framework of the specific case of Puerto Rico, the interviews performed with the different officials of the Department of Education, the empirical work performed by two education centers that use different alternative education methods, and the comparison of charter schools in Puerto Rico to cases in California and New York, allowed us to have answers to the initial conundrums, reach conclusions and offer some recommendations on public policy for the public education system of our country.

Findings

This study filled the void of literature about charter schools on the island. The findings of this research have been surprising. Among them, the following stood out:

- The two charter schools pilot projects have been relevant and successful because they rendered immediate benefits to the community they serve.
- The charter school model represents the public education paradigm for youngsters coming from impoverished and violent sectors in our country.
- Charter schools do not represent a budgetary expense for the Department of Education; they are instead an advantage.
- The particularity of the success of this model depended specifically on the community and historic leadership in both cases, as well as, large external financing by philanthropic organizations and foundations that made a bet on that reality.
- The charter schools in other latitudes, particularly in the United States, have implied in some cases the exclusion and marginalization of some sectors due to class, race, and ethnic origin of that society. In our case, as opposed to the example studied in the United States, charter schools have meant the empowerment of these communities.
- It is important to point out that in our evaluation, we saw evidence of some proponents' intention to privatize the charter schools and did not necessarily have the intention to empower those communities.
- The education vouchers did not turn out to be of interest for the education process at this stage of the education reform experiment.

Recommendations from Study # 1:

From the research, some limitations and/or obstacles for the education system have been observed when it comes to implementing its public policy, and it is important to reflect upon that. Some recommendations on that matter to be considered are the following:

- A substantial endowment fund is recommended by the Department of Education to expand the experience of the charter schools in the communities with the most disadvantages.
- To create an evaluation commission sponsored by philanthropic foundations and reputed citizens in the community to contribute to these projects with an element of rigor in evaluating academic performance, the relevancy of the curriculum, and job placement.
- To watch over interests that are foreign to the best educational purposes and are trying to meddle with the charter school projects, since the same may be actually damaging to the schools' good performance.

- The education vouchers do not seem to be an alternative of interest for our students. The small amount requested by students did not allow us to conclude affirmatively about the positive or negative consequences of this education proposal.
- The recommendation in both cases is to constitute two bodies of evaluation and continuity of public policies independent from the Department of Education and the government agenda, so there will be continuity in the public policies.

Study # 2: socioeconomic and demographic profile by age and gender of youngsters who have not completed high school in Puerto Rico between 2010 and 2018.

Description of Study #2

In this work, presented as part of the Observatory of Education's first report, we contribute to the literature about school dropouts in Puerto Rico, focusing on five main objectives. First, we identify the dimension of the school dropout problem in Puerto Rico within the last few years (since 2010). Second, we document changes in school dropout levels by age and gender during the last decade. Third, we analyze at what moment of a 'youngsters' life cycle and age the school dropout problem start being manifested and concentrated. We discuss at what age we start to see high levels of school dropout and the pattern when leaving the school, whether after having completed their studies or after having left the school before completing them as they grow older. We have identified what percentage of the population between 10 and 28 years old can be considered school dropouts and how the pattern has changed in recent years. Forth, we examine the main demographic and socioeconomic characteristics of school dropouts in Puerto Rico, and compare it to the youngsters who completed high school but did not go to college. That group is a benchmark; although, we also compare the school dropouts with other segments of the population, including people with some university courses (but who did not complete their college degree), people who completed high school but did not go to college, and youngsters who finished college. Fifth, we analyze the impact and the possible consequences of school dropout on employment, unemployment, labor participation levels, and how it relates to poverty levels among youngsters in Puerto Rico.

Findings of Study # 2

Changes in the Population between the ages of 10 and 28 years old

The young population in Puerto Rico has decreased significantly. The total population of Puerto Rico has been reduced from 3.722 million in 2010 to 3.195 million in 2018. It is a reduction of 526,980 individuals or a 14%. However, Puerto Rico's population between 10 and 28 years old decreased from 1,005,786 in 2010 to 781,786 in 2018. It represents a loss of 224 thousand individuals or a percentage change of 22%. The population of Puerto Rico between the ages of 10 and 28 years old represented 27% of the population in 2010 and went down to 24.5% of the total population in 2018.

School Dropout Patterns by Age and Genders

When we examine the patterns during the decade, we found that school dropout ('age-specific dropout ratio') for the population between 10 and 28 years old showed a decreasing pattern during this decade from 9.0% in 2010 to 4.6% in 2018. School dropout among women is lower when compared to men of all ages. The school dropout rate for men between 10 and 28 years old decreased from 10.4% in 2010 to 5.6% in 2018. The rate was lower for women and decreased from 7.6% in 2010 to 3.7% in 2018. Women's dropout rate has been lower during the entire period when compared to men's.

For persons between 10 and 17 years old, school dropout was lower than their elders and fluctuated between 3.1% in 2010 and 2.6% in 2018. For the people between 18 and 22 years old, the dropout rate was 11.8% in 2010 and decreased to 4.6% in 2018. This number reflected better the school dropout since it included ages of individuals who were expected to have had the opportunity to complete high school. The dropout rate among people 23 to 28 years old was 15.1% in 2010 and decreased to 7.1% in 2018, showing some indications of what could have been the dropout rate for that population cohort some years before.

Changes in Other Education Levels

The changes in schooling among youngsters in Puerto Rico could be better deciphered if we study the population between 21 and 28 years old. If we focus on this more advanced age group, we will see how the percentage without a high school diploma decreased from 15.3% in 2010 to 7.4% in 2018. At the same time, the percentage of youngsters between 21 and 28 years old with a bachelor's degree or more increased from 15% in 2010 to 21.8% in 2018. The ratio of youngsters with some college but no degree remained relatively stable through the decade at 31%. Likewise, the percentage of youngsters who completed a high school degree and did not attend college was around 23%. The percentage of youngsters with an 'associate's degree slightly increased from 10% in 2010 to 12.8% in 2018. It shows that there has been a significant increase in the proportion of youngsters with college degrees. It includes a slight increase in the proportion of those with 'associate's degree as well as a significant increase in the proportion of those with a college degree. The proportion of youngsters with a 'master's degree (or more) has remained within 2% and 3% of the youngsters between 21 and 28 years old. Likewise, the proportion of youngsters with the equivalent of a high school diploma or GED remained at 2% during this decade. It showed that the significant increase in the proportion of youngsters with a high school diploma was not a result of a disproportionate increase in high school diploma equivalents or GED. Likewise, the increase of college degrees responded to a significant increase in the percentage of 'bachelor's degrees and not to a disproportionate increase during this decade of youngsters with 'associate's degrees.

The Effects of Emigration in School Dropout

In 2013, it seems there was a significant difference between the youngsters who emigrated from Puerto Rico with a larger rate of school dropout at 19.85 when compared to youngsters residing in the island with a school dropout rate at 12.6%. However, the school dropout rate of migrant youngsters decreased from 19.8% to 7.4%, a significant decrease, which showed that the youngsters who were leaving the island in 2018 had more schooling

¹ Age Specific Dropout Ratio= $\frac{DaIPa}{Da} \times 100$ Da=Not registered a without completing level I / Pa=Population by age a. See Seigel, Jacob and David Swanson. (2004). *The Methods and Materials of Demography*. New York: Elsevier Press.

and lower school dropout levels compared to the youngsters who did not migrate. It implied that emigration did not explain the decrease in the school dropout observed on the island, thus invalidating the argument that the school dropout rate on the island decreased because the school dropouts emigrated. On the contrary, the levels of education of the emigrant youngsters confirm the dropout decrease and the increase in the proportion of youngsters with college education.

The Impact of Poverty in School Dropout

The poverty level of youngsters between 10 and 28 years old in Puerto Rico was 51.2% in 2010, and that proportion was decreased to 48.7% in 2018. The percentage of youngsters whose family income was between the poverty level and double of the poverty level, that are considered low income youngsters, remained relatively stable at 25.8% in 2010 and 26.4% in 2018. The percentage of youngsters between 10 and 28 years old whose families had an income of more than double the poverty level (middle and high class) slightly increased from 21.6% in 2010 to 23.9% in 2018. When we analyzed the population between 21 and 28 years old, we noticed that their poverty level was slightly lower than that of the younger segments of the population. The poverty level for this segment was between 47.8% in 2010 and 44.5% in 2018. The poverty levels for the youngster population in Puerto Rico seemed to have decreased very little during the last decade.

The school dropout levels decreased significantly during this decade for youngsters at all income levels. However, certainly, the poorer youngsters who came from lower-income families had much higher probabilities of becoming high school dropouts, and there is a very stark difference. For the youngsters between 10 and 28 years old in extreme poverty, whose family income was lower than half of the poverty level (income less than \$6,000 yearly), the school dropout rate was 15.7% in 2010 but then went down to 7.8% in 2018. For youngsters located in the 50% to 99% of the poverty level (with income more or less between \$6,000 and \$12,000 yearly), the school dropout rate was lower than that of youngsters in extreme poverty, and it decreased gradually from 8.3% in 2010 to 5.1% in 2018. The school dropout rate for youngsters near the poverty level (with income between \$12,000 and \$18,000 yearly) was 7.5% in 2010, and it slightly decreased to 4.5% in 2018.

Similar to youngsters between 10 and 28 years old, the school dropout rate for youngsters between 21 and 28 years old had a significant variation based on the poverty level. For youngsters in extreme poverty whose family income was lower than half of the poverty level, the dropout rate was 27.4% in 2010; however, it decreased to 11.4% in 2018. This is a significant and positive reduction. For youngsters between 50% and 99% of the poverty level, the dropout rate was lower than for youngsters in extreme poverty, and it decreased erratically from 14.2% in 2010 to 9.6% in 2018. The school dropout rate for youngsters near the poverty level was 11.6% in 2010 and decreased to 7.9% in 2018. We have also noticed reductions in the dropout levels for youngsters with higher family incomes.

Other Socioeconomic Factors and School Dropout

Beyond income and poverty levels, there are other socioeconomic factors that were related to higher rates of school dropouts. Youngsters who indicated having physical disabilities had a much higher school dropout rate than the youngsters who did not indicate having said disabilities. Youngsters born in a foreign country and

² In 2020, the poverty level for a person was \$12,760, for two was \$17,240 and for 3 was \$21,240. See <https://aspe.hhs.gov/poverty-guidelines>

who were not citizens had a significantly higher school dropout rate than youngsters born in Puerto Rico, the continental United States, or naturalized. Youngsters who stated they could not speak English at all had a higher school dropout rate than the youngsters who stated they master English. Youngsters who were married or divorced had a significantly higher school dropout rate than those who had never gotten married. In the case of divorced students, the differences were not statistically significant in 2018. And, finally, women who indicated having had a child the year before had a significantly higher school dropout rate than other females within the same age group.

Employment Status for the Population between 21 and 28 Years Old and the Consequences of School Dropout

The percentage of persons between 21 and 28 years old who were employed remained stable between 45.9% in 2010 and 47.4% in 2018. The percentage of unemployed persons ranged between 16.2% and 15.5%. The proportion of persons outside of the labor force ranged between 37.9% in 2010 and 37.1% in 2018. Once again, it was surprising that there were not dramatic increments and a notable increase in the labor participation of youngsters, given the significant reductions in school dropout and the significant increase in the proportion of youngsters with a high school diploma, university experience, or a college degree.

The percentage of school dropouts between 21 and 28 years old who were employed was relatively low compared to other youngsters and has decreased even further from 25.6% in 2010 to 18.4% in 2018, while the percentage of unemployed school dropouts remained stable around 20.0% in 2010, 17.9% in 2014 and 18.4% in 2018. The proportion of school dropouts outside the labor force increased from 54.4% in 2010 to 62.0% in 2018. It showed that the cost of dropping school and the labor consequences seemed to have increased significantly throughout the decade. The school dropouts were relatively more isolated from the formal labor market each year.

After comparing the labor status of school dropouts with non-dropout youngsters, we found that the percentage of non-dropouts between the ages of 21 and 28 years old who were employed remained stable within 49.4% in 2010 and 48.3% in 2014, and 49.5% in 2018. The percentage of unemployed non-dropouts remained stable at 15.4% in 2010, 16.1% in 2014, and 15.2% in 2018. The proportion of non-dropouts outside the labor force remained stable at 35.1% in 2010, 35.6% in 2014 and 35.2% in 2018.

The main findings of our study included what could be considered good news and bad news. The good news are that one can notice a significant decrease in the proportion of youngsters who did not complete their high school and who were not registered in a school from 15.3% in 2010 to 7.4% in 2018. Likewise, we have observed a significant increase in the proportion of youngsters with a college degree, 'bachelor's degree and beyond, from 17.2% in 2010 to 24.8% in 2018. We have also noticed that youngsters in extreme poverty whose family income was less than half of the poverty level (yearly income less than \$6,000) had a school dropout rate of 27.4% in 2010, but it went down to 11.4% in 2018. This is a significant and positive reduction. However, the poverty levels for youngsters between the ages of 21 and 28 years old have remained relatively stable and have not decreased as much as it would have been expected given the school dropout reduction and the increase in the proportion of youngsters with college degrees. We have also observed that there has not been a significant increase in the proportion of employed youngsters, nor has there been a notable reduction in the

proportion of youngsters outside the labor force. This suggests that the significant advances in education among youngsters in Puerto Rico as well as the reduction in school dropout and the increase in the proportion of youngsters with a 'bachelor's degree or more have not translated into a significant reduction of poverty levels among youngsters or into a significant increase in labor participation.

Recommendations from Study # 2

We know that the number of youngsters in Puerto Rico has decreased and that school dropout has also decreased, and this represents an opportunity to continue the efforts to establish and support institutional programs and initiatives that will continue reducing the school dropout rate and increasing the proportion of youngsters graduating from high school. Efforts to offer support and alternatives to students who are getting delayed in high schools and are at risk of dropping out of school must be continued.

Many youngsters from poor families need support in the transition between high school and college to succeed while sailing through the academic world with limited resources. Furthermore, not all youngsters are equipped or desire to go to college and that must not condemn them to a life of poverty. Efforts to provide different professional alternatives and pathways for non-college youngsters, including access to internships, mentoring, programs, and tools necessary to be able to learn a trade and develop their capacity to obtain a good salary and provide a decent income for their families must be continued.

In this respect, it is compulsory to double the efforts and strategies to fight and reduce family poverty and inequality in Puerto Rico. Youngsters from poorer families have a higher school dropout rate, less access to college, and a rougher entry to the formal labor market.

The efforts of philanthropic and non-profit organizations within the education sector have developed successful models and interventions, allowing for better quality education for youngsters and children from low-income families. These efforts and initiatives must continue and expand.

It is essential to foster the quality of college offerings and develop efficient mechanisms to remove from the market institutions that do not graduate a significant number of students nor provide opportunities to improve within the labor market. It is essential to have quality at the universities and university programs fostering access, retention, graduation, and connection of youngsters to the labor market and facilitating employment transition. It is also essential to develop island-wide community economic development strategies to increase employment opportunities and salaries of existing jobs in Puerto Rico. Strategies increasing the quantity and quality of employment and encouraging youngsters to return to education are essential, so education yields translate into better opportunities and higher income. Likewise, it is essential to support public strategies and policies that make a 'job to be 'worthwhile' and that the levels of education translate into broader job opportunities.

Finally, It is essential to support research on the characteristics, conditions, and results of public policies and social processes impacting the youngsters. It is necessary to understand better how and under what conditions the advance in education among youngsters in Puerto Rico may translate into a significant reduction of poverty and an increase of labor participation for this very important segment of the population, key to the future of Puerto Rico.

Study # 3: What Lies Behind the Variations in Academic Performance Among Public Schools in Puerto Rico? Sociodemographic, Community and School Factors

Description of Study # 3

Disparities in the quality of education within the education systems have been a reason for concern in the United States, as well as in Latin America, thus affecting disproportionately marginalized communities and perpetuating poverty and inequality (Renewing America, 2013; CEPAL, 2015). In Puerto Rico, Ladd and Rivera-Bátiz (2006) also mentioned the lack of uniformity in the public education system's quality as one of the main problems. This work measured how much sociodemographic and community factors and school characteristics affect the average academic performance of each school in the public system in Puerto Rico.

The objectives of the study include the following:

- a. Evaluate the different factors that come into play in academic performance to identify the public policies that foster positive efforts and reduce negative factors.
- b. Estimate the added value in each school after taking into consideration the effect of the factors that are not under the 'school's control, that is to say, sociodemographic and community characteristics.
- c. Identify the factors that can contribute to the value added the school offers.
- d. Provide a ranking of schools according to their value added.

The analysis is divided into three parts. The first part measured the effect of sociodemographic and community variables in academic performance as measured by the results of the test Measurement and Evaluation for the Academic Transformation of Puerto Rico (Medición y Evaluación para la Transformación Académica de Puerto Rico, META, in Spanish) and the school dropout rate. The second stage estimated the value added of each school. The value added is defined as the difference between the value observed for the academic performance indicator of each school and the expected value of the school, pursuant to the characteristics of its student population and the community. The third stage evaluated how the school variables affect the school's value added.

The data used for this analysis included information from schools active in Puerto Rico during the following school years: 2016-2017, 2017-2018, and 2018-2019. The results of the META test per student and the school dropout rate were obtained from the Department of Education of Puerto Rico (DE). Likewise, the DE provided data related to the 'students' socioeconomic level and demographic composition. Each school was assigned the characteristics of their community, obtained by census tracts from the Puerto Rico Community Survey (PRCS). The type 1 crime rates by census tracts were also calculated based on crime data from the Puerto Rico Police Department.

Based on the META test results, an academic performance indicator was created for each school and each school level (elementary, middle school, and high school). The data regarding META test results assigned each student a level of mastering of the corresponding subject matter (Spanish, English, and Math). These include: pre-basic, basic, proficient, or advanced. For our analysis, it was necessary to transform those categories into

a numeric variable. To create the global performance indicator, we started by creating an indicator per subject matter and school level which pondered the percentage of students who obtained a score of pre-basic, basic, proficient, or advanced according to the following formula:

$$\begin{aligned} I_{nait} = & 4 * \text{Percentage of advanced students}_{nait} \\ & +3 * \text{Percentage of proficient students}_{nait} \\ & +2 * \text{Percentage of basic students}_{nait} \\ & +1 * \text{Percentage of advanced students}_{nait} \end{aligned}$$

(I) represents the indicator per subject matter and level, subscript n refers to the level (elementary, middle school, or high school), subscript a refers to the subject matter (Spanish, English or Math), and subscript it refers to school i at year t. Afterward, the three subject matters indicators are averaged to obtain a global performance indicator (GPI).

Analysis and Findings of Study # 3

Analysis of the effect of sociodemographic and community factors on academic performance

An econometric regression analysis is used to measure the effect of sociodemographic and community variables on academic performance. The dependent variables used were the school's GPI per educational level and the school dropout rate. The first group of estimates included as explanatory variables the sociodemographic variables taken from the school profile. These are: the percentage of students living in households with incomes under the poverty level, the percentage of students participating in the special education program, and the proportion of female students. The second group of estimates also included the variables corresponding to the census tracks where each school is located. Among these we found: the percentage of adults per school attainment, percentage of female headed households, the percentage of households with grandparents in charge of their grandchildren, the crime rate, and the Gini coefficient. Dichotomous variables were also included to measure the effect related to the year in which the data is observed.

Summary: Effects of sociodemographic and community variables on school GPI.

- The sociodemographic variables explained 5% of the observed variation in the GPI among schools at the elementary level, 35% at the middle school level, and 62% at the high school level.
- The most important variable explaining GPI's differences among schools was the percentage of students under the poverty level.
 - ▼ A one standard deviation increase in the poverty percentage reduced the GPI by 7% for middle schools and 8% for high schools.
- The percentage of students participating in special education reduced the GPI in middle school and high school, but not in elementary school.

- Elementary and middle schools in rural areas had higher performance indexes than their urban counterparts.
- Community variables (from the census tracts) had little explanatory power with respect to the GPI variation among schools. However,
 - ▼ At the elementary level, the percentage of adults with just a high school degree and the Gini coefficient had a positive effect.
 - ▼ In rural areas, family composition seems to be more relevant in explaining GPI differences in middle and high school.

Summary: Effects of the sociodemographic and community variables on school dropout rate in middle and high school.

- Results related to middle schools' dropout rates:
 - ▼ The percentage of students participating in the special education program increases the school dropout rate.
 - ▼ The crime rate is associated with higher dropout.
 - ▼ Economic inequality is associated with lower dropout rates.
- Results related to high schools' dropout rates:
 - ▼ The dropout rate increased significantly during the 2018-2019 school year.
 - ▼ Poverty is related to higher dropout rates, in particular in urban areas.
 - ▼ The adults' education attainment in the community is directly associated with dropout rates, raising questions about the relation between the school and 'students' households location.
- In both cases, the percentage female headed households in the community is related to higher dropout in urban areas.

Analysis of the effect of school variables on the value added

On the second stage of the analysis, the school's value added was estimated as the difference between the GPI observed in each school at each level and the expected indicator pursuant to the regressive statistics analysis before mentioned. A regression statistical analysis that used as dependent variable the value added for each school level is used to measure the school variables' effect. This analysis was performed with the 2018-2019 data since we only had available the school variables for that year.

Among the independent variables included in this analysis we found: school enrolment (it measured the schools' size), the ratio of students per teacher, the percentage of teachers with 'master's degrees or doctorates, the percentage of teachers with exemplary evaluations if the director obtained an exemplary evaluation and the education region where the school is located.

Summary: Effects of school variables on the value added

- The quality of the teachers measured in terms of their evaluations and attendance rates has an important effect on the school's value added at all levels.
- At the elementary and middle school level, smaller schools are associated with higher added value.
- Although the school's size and the ratio of students per teacher are relevant factors at the elementary and middle school level, the school's size lost its significance at the high school level.
- At the high school level, teachers educational attainment becomes more relevant.
- The schools in the region of Humacao consistently showed significantly lower value added than the rest of the regions. The opposite was true for Arecibo and Caguas that showed better results at the elementary school level when compared to the other regions.
- It means that the policies at the regional level could also have an impact on school performance.
- The value added had a negative correlation with the percentage of students under the poverty level at the middle and high school level, thus compromising the education system's capacity to counter inequality.

Recommendations based on Study# 3

- It is required to take transforming actions addressing poverty as well as other sociodemographic factors affecting 'students' performance, such as: coordination initiatives between schools and community institutions, collaboration initiatives with the parents and adequate management of the socioemotional component.
- The middle school level seemed to be the breaking point of the special education program that must be addressed expeditiously.
- Develop a plan to reopen some of the schools that were shut down recently with the purpose of having smaller schools and groups. The same must take into consideration the education level being taught (with an emphasis in elementary school), the 'students' poverty level, and the number of special education students.
- Policies addressing a better teacher performance are recommended, among others: assure high quality and continuous training, foster healthy conditions for teachers to minimize absences, set strict controls to keep track of attendance, strengthen the evaluation processes, and use merit criteria for personnel promotion and retention. Opportunities must be expanded, and incentives must be improved to encourage high school teachers to continue post-graduate studies, particularly for teachers in schools with a low socioeconomic status.
- It is important to emphasize measures leading to improving the quality of teaching in schools serving the most disadvantaged students.

Study # 4. Regional socioeconomic profile and its relationship with school segregation in the public schools of Puerto Rico

Description of the study

Not all communities present the same degree of commitment to education in a country or region due to its socioeconomic characteristics. Some communities are more vulnerable than others, where 'students' performance and level of education are negatively affected, and their social mobility capacity. This generally occurs in low income communities that may be in rural areas or in the country's poor urban areas. It could be said then that social inequality has repercussions on academic performance, thus generating academic segregation. Academic segregation understood as the unequal distribution of students in schools based on their personal and social characteristics, is an element of educational inequality that clearly also impinges on social inequality.

When analyzing the 'students' academic performance at the regional setting, it is desirable to have heterogeneity within schools and homogeneity among schools in the region. Heterogeneity within the school leads to a possibility for the more vulnerable to improve while sharing with those having better socioeconomic characteristics and a better performance. When there is homogeneity in the schools, there is a self-reinforcement effect by the peers affecting the teaching-learning process. In a case where the majority of students are poor, the obstructive resources multiply and the facilitating resources are divided. This will lead to worse academic performance, less resources for the school, and worse quality in the teaching process.

In this research, we attempted to answer the following question: Is there a relationship between socioeconomic school segregation and academic segregation at the regional level in the public schools of Puerto Rico? In order to answer it, the objective of this research was to show if regional socioeconomic homogeneity (or by income) of schools in the public system in Puerto Rico led to a homogeneous academic performance through the self-reinforcement effect. For this purpose, the Duncan index of dissimilarity was applied using the data from the 2017 Community Census Survey and the Department of Education for the school year 2017-2018.

The work has been divided into five parts: the first part, is a literature review of the determinants of academic performance. Different aspects related to social mobility, the role of production in education, and segregation are included. After that, the methodology for the segregation estimations through Duncan index of dissimilarity is explained. The results are shown per municipality for each segregation measure. A distinction was made between the rural and the urban areas to identify differences, had it been the case. The results section includes dispersion graphics as well as the correlation and determination coefficients for academic education segregation with respect to the other segregation measurements. At the end, the conclusions and recommendations were presented.

Findings

Summary of Findings

- The segregation by income in Puerto Rico is low when evaluated by census block.
- The socioeconomic school segregation is low when taking into consideration the poverty level of students in public schools in Puerto Rico by municipality.
- The academic school segregation is low among public schools in Puerto Rico when evaluating students' academic performance with respect to their grades by subject matter.
- The socioeconomic school segregation showed a link with the academic education segregation, which may mean that inequality in academic performance among schools in each municipality is due to economic inequality.
- There was a higher correlation between academic and socioeconomic school segregation in rural areas than in urban areas.
- When evaluating the academic school segregation in the municipalities with a particular socioeconomic profile, including income, poverty, school poverty, and education, it was found that there was not much difference among the municipalities selected for the study. However, the largest difference occurred when the municipalities were divided according to the degree of school poverty. The municipalities with higher school poverty showed more homogeneity in academic performance, indicating more inequality among schools in urban areas.
- The set of results obtained from the evaluation of the indexes for academic achievement, school quality, and school management of the Department of Education showed larger segregation or inequality among municipalities in rural areas in Puerto Rico.
- School management stood out as the most segregated aspect found in both areas, but much more so in the rural area.

Recommendations

Academic segregation, seen as the unequal distribution of students in school based on their personal or social characteristics, is an element of education equity with a clear impact on social inequality. In terms of public policy, it means that any strategy or measure addressing the socioeconomic differences of students in the public system of Puerto Rico will have a positive impact on the academic performance of the poorest and the most vulnerable. It will even show individual as well as macroeconomic benefits, thus increasing the possibility of social mobility for the poorest students and enhancing the possible growth of the country.

The policies intensifying the privatization of the education system may lead to larger education segregation given the fact that the students with the lowest income will be the most negatively affected in their academic performance due to the so called self-reinforcement. Students with the highest income will benefit even more

of the process, increasing then social inequality. In Puerto Rico, the current public policy, Law # 85 of 2018, focuses on using instruments such as the education vouchers in the Free School Selection Program and the so called Charter Schools. These measures may contribute to increase the inequality within the system and polarize still further the poor students and the medium and high income students. More so, when the education voucher does not allow for the payment of full tuition in a high quality private school that could be better than the education received by students in the public system. Only the father, mother, or custodian who can complete, in addition to the education voucher, the tuition of a good quality private school will be able to take their children out of the public system. Hence, the possibility that using the vouchers would increase inequality and would generate a still broader polarization.

If there is homogeneity among public schools and an apparent high segregation if we include the private schools, we could start thinking about "'desegregation' policies. Considering the entire education system of the country (private and public schools), the desegregation policies would have the objective to maintain a uniform distribution in each school among the different students based on socioeconomic grounds to improve the disadvantaged situation in academic achievement of the most vulnerable. However, it is evident that the government cannot have control of the families who decide to send their children to private schools. However, it can in fact improve the conditions of the public schools, the resources available, the distribution, and the quality of teaching. Hence, the strategies must be directed to these aspects and may be divided into short, mid, and long term with micro and macro effects.

The following recommendations are presented:

- To improve the challenging socioeconomic context in which many public schools and students find themselves. This cannot be changed in the short-term and implies linking the education public policy to the country's economic development model. If this linking or integration is achieved, its repercussions will be manifested in the long-term, and very likely, in future generations. The results would benefit students individually, improving their academic achievement and social mobility capacity, thus allowing for an increase in their future income. It would also have a positive macroeconomic effect since it would allow for the creation of human capital that would contribute to the economic growth and development of the country.
- To evaluate the effect on the current education inequality of current public policy in Puerto Rico, Law # 85 of 2018, since it focused on the utilization of instruments such as the education vouchers of the Free School Selection Program and the so called Charter Schools, measures that could contribute to increasing the inequality within the system.
- To differentiate the public policy for rural areas in the country, identifying what factors may reinforce the quality of teaching in rural municipalities in such a way that it will compensate for the negative effect of economic inequality.
- To evaluate the derived benefit of each dollar invested per student in schools and identify the factors causing the difference in performance (obstructive resources). In this manner, an equitable distribution of resources (based on their needs) can be done as well as be accountable with respect to investment and performance.

Study # 5: academic achievement and the closing of schools in Puerto Rico

Study # 5: Description and context

In the related literature, there is mixed evidence about the consequences that the closing of schools in different jurisdictions has had on academic achievement. However, most of the articles have pointed out that there have been detrimental effects on the students. De la Torre and Gwynne (2009) found that many displaced students in schools closed in Chicago were registered in schools with academic achievement lower than the schools closed, thus reducing the displaced students' academic potential, at least during the first year. Larsen (2020) identified 33 schools closed in Milwaukee where some displaced students converged with their expected education levels, while others did not. Rumberger and Larson (1998) found that after controlling other factors, the forced school mobility due to a closing represented a risk factor to successful graduation. Engberg et al. (2012) and Brummet (2012) found that displaced students were negatively affected by the closing of schools, unless the receiving school had a superior academic quality. However, De la Torre and Gwynne (2009) noted that only 6% of the displaced students in Chicago was able to register in a receiving school with a better academic quality compared to the closed school. Kirshner et al. (2010) found that the closing of schools in Jefferson, Riverside, worsened the educational challenges of the displaced students.

Puerto Rico closed 34% of its schools between 2017 and 2019, which probably makes it the most intensive school closing ever studied. In particular, during the school year 2018-2019, 225 schools were closed, and in the school year 2017-2018, 183 schools closed. There were 58,606 displaced students, of which 2,616 underwent more than one school closing. The Financial Oversight and Management Board for Puerto Rico recommended the closing of schools based on conjectures about its positive effect on the quality of education, and former Secretary of Education justified said closing due to fiscal savings that were needed. However, during fiscal years 2017 through 2020, the 'state's expenditures with respect to the operation of schools was reduced by \$34.5 million, whereas allocations such as maintenance of schools increased by \$311.7 million during the same period, in part due to services needed for the closed schools. In this process, no consultations were performed with the communities before the closing, and the teaching personnel was not selected based on merit but rather on seniority at the Department of Education (DE). 78% of the students of the public system are below the poverty level, but the displaced students had a higher incidence of poverty.

Drawing on the availability of student-level data, this work used casual inference methods and found that this broad consolidation had negative effects on the academic achievement of the displaced students. The results of the standardized tests taken by mainstream students in the public system in third, fourth, fifth, sixth, seventh, eighth, and eleventh grade were used in the empirical analysis.

Study # 5: Findings

After matching the students with the data based on different observable characteristics such as age, gender, poverty level, and quality of receiving school, among others, the following findings were revealed:

- Students who experienced a closing of a school had between 0.035 and 0.0404 higher probability of obtaining lower scores in META test compared to non-displaced students.
- Despite the fact that the average academic achievement of all students went down from 2017 through 2019, the 'students' performance in the standardized tests, META, went further down from one year to the next for displaced students when compared to non-displaced students. This negative outcome remained under different specifications of the model.
- After two years, the displaced students continued showing a lower academic performance compared to their non-displaced counterparts.

Recommendations based on Study # 5:

The reopening of some schools should be considered. The reduction in the student population can allow for smaller groups in the classroom, facilitating the possibility of teachers offering more individualized instruction and thus improve the academic performance. This would allow for a better attention to the broad functional diversity of the students in the public system where at least 17% has been diagnosed with special learning problems. This reopening would also contribute to the resilience of the public system given the continuous incidents of natural disasters in Puerto Rico.

Since the average score in the standardized tests has gone down in the last three years in the public system in Puerto Rico, a better alignment of the school curriculum with the META test is recommended, and to make it compulsory for teachers to include the results of the META test in the course grade in order to encourage a better execution. In the past, there have been initiatives on this matter, but they have not been implemented in a uniform manner. Some fear this may penalize students with academic lagging who may not obtain good scores in the META test until they can overcome their lags; but it is most likely that the lagging will lead the student to obtain lower grades at school, hence it will not have a negative effect. Currently, some students have little incentive to put major effort into the META test.

The integration of parents to the academic life is fundamental for the academic achievement of their children. Dr. Caraballo suggested that said integration can be broadened if assisting in-person to receive their children's grades and parents and teachers assembly becomes a requirement to participate in programs such as the public health program. Currently, the verification of the student school attendance is required for the family to participate in said health plan, but parents are not required to participate in the student life of their children. This requirement can be implemented through new legislation creating a two-hours leave for parents to be able to attend these school activities without affecting work stability.

Looking into the future

Among the five studies included in this report, a series of common elements are intertwined, as well as concerns looking into the future, that must be underlined. They are the following:

- There is a concern about the continuity of education public policies. On this matter, there are two important elements to be considered. One is the continuous rigorous evaluation of the implemented public 'policies' effects, which is vital to identify the policies yielding greater benefits. The other one is the need to establish continuity within the processes of the Department of Education.
- Poverty and its consequences rise as another central element given the multiple paths through which it affects our children and youngsters' academic development. Its roots go beyond the education system and therefore requires a collective effort of different sectors of society to tackle the problem.
- The lack of adequate attention to the specific problems of special education students is evident in the performance of middle and high school students, and in the higher school dropout rates observed among persons with disabilities. To achieve a truly inclusive society, it is urgent to concentrate on efforts and programs that can have a measurable impact on special education program participants.
- The massive closing of schools has reduced the capacity to create more adequate learning environments, in particular, for students in more vulnerable situations. Besides, it reduces the capacity to increase resilience in the face of emergency situations. The possible reopening of some schools must be considered, taking into account the education level, the conditions of vulnerability of the student population, and the specific community situations.
- Finally, in the last 3 years, Puerto Rico has suffered hurricanes, earthquakes, and a pandemic, stressing the need to have a more agile education system that can respond to the needs of the student population striving in the midst of emergency situations. It remains on the agenda to work on a system that can address these needs taking into account that the most vulnerable students are precisely the ones who need the most support.

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