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RESEARCH ARTICLES

Education and Family Support, and Mathematics Achievement in Two Different Sociodemographic Contexts

Educación y apoyo familiar, y logro en matemáticas en dos contextos sociodemográficos diferentes

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Summary

This paper presents the results of a non-experimental cross-sectional study conducted under a mixed explanatory design (with manifest and latent variables), in an indigenous school in a rural area and an urban school in Morelos (Mexico). The sociodemographic context of the schools of origin was considered as a predictor variable of Mathematics achievement in 6th grade of primary school, and the educational level of the parents and family support were considered as mediating variables. At the end of 6th grade, students from both schools answered a scale on family support and a short test on two mathematical competencies: Communicating mathematical information and Using techniques efficiently. The data were analyzed with two structural regression models of relationships between manifest variables (school context and parents' educational level) and latent variables (family support with eight items and mathematics achievement with two mathematics competency indexes). Mathematics achievement was the final latent variable to be explained. Both resulting models showed that mathematics achievement was significantly and positively explained by the latent variable Family Support, and indirectly and positively by the manifest variable Parental Education, which in turn was significantly but negatively explained by the manifest variable School context. The findings support the hypothesis that students' learning opportunities depend to a large extent on the socioeconomic and educational context of the families, which are determined by the demographic and physical environment where they live and study.

Keywords: sociodemographic context; parental education; family support; academic achievement.

Resumen

Este trabajo presenta los resultados de un estudio no experimental, transversal, realizado bajo un diseño explicativo-mixto (con variables manifiestas y latentes) en una escuela indígena de zona rural y una escuela urbana de Morelos (México). Se consideró al contexto sociodemográfico de las escuelas de procedencia como variable predictora del logro en matemáticas en 6to grado de primaria, y como variables mediadoras, el nivel educativo de los padres y el apoyo familiar. Al término del 6to grado, los alumnos de ambas escuelas respondieron una escala sobre apoyo familiar y una prueba corta sobre dos competencias matemáticas: Comunicar información matemática y Manejar técnicas de manera eficiente. Los datos se analizaron mediante dos modelos de regresión estructural de relaciones entre variables manifiestas (contexto escolar y nivel educativo de los padres) y variables latentes (apoyo familiar con ocho ítems y logro en matemáticas con dos índices de competencias matemáticas). El logro en matemáticas fue la variable latente final a explicar. Ambos modelos resultantes mostraron que el logro en matemáticas fue explicado significativamente y de forma positiva por la variable latente Apoyo Familiar, y de manera indirecta y positiva, por la variable manifiesta Educación de los padres, variable que a su vez fue explicada de forma significativa pero negativamente, por la variable manifiesta contexto de procedencia de la escuela. Los hallazgos respaldan la hipótesis de que las oportunidades de aprendizaje de los estudiantes dependen en gran medida del contexto socioeconómico y educativo de las familias, los cuales están determinados por el entorno demográfico y físico donde se vive y se estudia.

Palabras clave: contexto sociodemográfico; educación de los padres; apoyo familiar; logro académico.

Introduction

Sociodemographic Context and Academic Achievement

The sociodemographic context of students and their families in a community and the school background, where most students of such community study, are variables essential to explain educational opportunities, learning processes, and academic achievement. The background of schools depends considerably on the physical, geographic, and environmental context in which schools, neighborhoods, communities, and cities are located and in which children develop their formal and informal learning processes (Hernández, 2006).

Since Coleman's contributions (Coleman et al., 1966; Coleman, 1968), contemporary literature has shown so far that students from families and communities of low socioeconomic status and low level of education, as well as from rural areas and with major sociodemographic problems, obtain the worst grades in academic achievement assessments (Backhoff, 2011; Quiroz et al., 2018; Muelle, 2020; Murillo and Carrillo, 2021). The results of the studies conducted by the OECD's Program for International Student Assessment (PISA), and the National Institute for the Evaluation of Education (INEE) in Mexico, have repeatedly pointed out that Mexican students from disadvantaged contexts, such as rural areas—mainly indigenous people—usually show lower scores and performance in cognitive levels related to reading and mathematics achievement, as measured by large-scale assessments (Backhoff, 2011; INEE, 2016; Blanco, 2017; González & Treviño, 2018; Hernández, 2018).

In most Latin American countries, people with low income and low level of education, and little access to health services and job opportunities live in rural areas with little road access. Consequently, families' low socioeconomic status adversely impacts students' learning and academic achievement because their families live permanently with economic, food, and cultural limitations and primarily few chances to choose a better sociodemographic context and access better education opportunities. According to Reardon et al. (2017), economic and demographic segregation can explain three-quarters of the geographic variations that create educational gaps.

Thus, low socioeconomic status affects learning opportunities by drastically reducing parents' possibility of choosing school and having supplemental academic support and additional educational materials, deepening educational inequality (Caro and Lenkeit, 2012; Olszewski-Kubilius and Corwith, 2018). According to Pearman (2017), consistent exposure to high-poverty human settlements adversely impacts mathematics achievement beyond that associated with individual, family, and school characteristics. In contrast, students from more advantaged socioeconomic and cultural conditions "possess higher scores from the outset than others and have steeper growth slopes" (Muelle, 2020, p.136).

Schools located in rural communities far from capitals or major cities have not only fewer chances to access better physical locations, culturally enriched environments, and settings, but worse health services and poor access to more-difficult-to-obtain goods, assets and conditions, hospitals, and means of communication (Arteaga and Glewwe, 2014; Hernández-Zavala et al., 2006; Santibáñez, 2016; Skevington, 2010). For Mexico, Juárez and Rodríguez (2016) have pointed out that educational inequality in the rural population in the 21st century is reflected "in less time spent in the educational system by girls and boys from rural schools, and in the low levels of academic achievement of rural students" (p. 8)

Santibáñez (2016) used the term "external channel" to refer to exclusion processes encompassing external obstacles that limit access to goods and facilities due to poverty and the geographic location of a community. Likewise, Ramírez et al. (2011) and Hernández (2018) have analyzed how actually indicators such as poverty, deprivation, disadvantage, physical and social

adversity, among others, must be incorporated to understand the impact of places and communities on learning processes and educational outcomes. Therefore, natural and geographic resources of the community could become a great wealth and cultural potential for communities when incorporated into socio-educational processes, for example, formal ones, which take place in schools near urban areas.

The above remarks aim to evidence that contextual and sociodemographic factors can influence educational outcomes and the quality of education (Boccaletti et al., 2018; Flanagan et al., 2019). Specifically, they point out that socioeconomic and demographic variables of students adversely impact learning or achievement indicators in assessments at various scales, as has been repeatedly demonstrated by the results of Mexican students in PISA assessments or nationwide. Unfortunately, students from schools and families with lower income and low level of education and those living in rural areas and belonging to indigenous groups show lower academic achievement in Mexico (INEE, 2016; Hernández, 2018; Blanco, 2019).

While it is true that the physical context does not directly determine school learning, it has been defined as an important condition for building educational capital in schools or some areas. For example, better trained and qualified teachers opt for schools in areas closer to cities (Backhoff, 2011; Santibáñez, 2016), so it is more likely to find in these types of schools and communities better qualified and more experienced professionals. Likewise, populations with lower level of education, low income, and very poor working conditions also occupy the most unfavorable physical environments in conditions of economic and educational vulnerability – lack of water quality, poor access to their homes or communities, or even difficulties in going to schools, due to the partial absence of roads or transportation, as in cities or semi-urban areas.

In rural geographic areas of Mexico, such as those indigenous communities in the south-central region of Morelos, where we conducted this study, governments have built several compensatory education schools, indigenous system schools, tele-secondary schools (distance or television-delivered education), and multi-grade schools to expand educational opportunities for children and young people of these geographic areas. However, these schools have shown lower performance throughout the different assessments (Backhoff, 2011; Blanco, 2017; UNICEF - INEE, 2016). Consequently, the gap between indigenous school students and non-indigenous school students in learning and school achievement remains (Santibáñez, 2016; Blanco, 2019), as in other Latin American countries (Treviño, 2006; Conconi, 2007; Avena, 2017).

Family and Academic Achievement Variables

When the aim has been to study the effect of sociodemographic context on academic achievement, different indicators have been used, such as socioeconomic and cultural levels or the possession of various household resources and material goods (OECD, 2013; 2016). However, little data has been reported on the effect of more general sociodemographic context variables, for example, the type of context: rural or urban context, or indigenous and non-indigenous population. However, those background context variables (socioeconomic and sociodemographic factors) have repeatedly shown their effect on academic achievement in large-scale assessments (Yang, 2017; Tourón et al., 2018; Caponera, et al., 2019; Muelle, 2020).

In addition, family variables have also shown significant effects on academic achievement when directly associated with the sociodemographic and economic contexts and when included as mediating variables between the socioeconomic and demographic contexts and academic achievement. Several studies on academic achievement have been reported, in small- and large-scale assessments, showing the effect of these family variables (Bazán et al., 2016; Rodríguez and González, 2018; Sayans-Jimenez et al., 2018; Tan, 2019; Bazán et al., 2022).

Thus, educational research has extensively discussed several family variables as significant predictors of academic performance in different domains (subjects), particularly mathematics (Bazán et al., 2016; González and Treviño, 2018; Grijalva et al., 2020). Among these variables, parents' level of education, parental involvement, family behaviors focused on supporting their children's learning and study activities have been widely examined (Altschul, 2012; Bazán et al., 2010; Delprato, 2019; Jardue, 1997; Yamamoto and Holloway, 2010).

Evidence of the effect of these variables on academic achievement is conflicting and further suggests that this effect is mediated or influenced by multiple factors, such as learning opportunities in school, family socioeconomic status (e.g., family income) and social contexts, parents' expectations and educational attainment, among others. An example in favor of the mediating role of family variables is the study reported by Altschul (2012), who found that the relationship between family income and children learning was mediated by family context variables, especially by parents' educational attainment and their parenting practices to support their children's school learning at home.

Based on the literature examined above, it is possible to assume that the relationship between physical and sociodemographic contexts of schools and academic achievement is significantly mediated by family variables, for example, parents' educational attainment and family support for home study. This study analyzed the effect of the sociodemographic context of the students and their schools: rural and indigenous, or urban and non-indigenous, on academic achievement in mathematics and posed two research questions: 1. How do the variables of Parents' educational attainment and Family support in learning and study influence their children's mathematics achievement at the end of the sixth grade of primary school? 2. How does the variable Background context influence the variables of Parents' educational attainment and Family support in their children's learning and home study?

In correspondence with the above, the aim was to determine the effect of parents' educational attainment and family support on academic achievement of sixth-grade students in two Mathematics curriculum-based competencies. Likewise, we sought to determine the influence of the school context variable (rural indigenous school context and urban non-indigenous school context) on the variables of Parents' educational attainment and Family support in their children's school learning in mathematics.

It should be mentioned that, for this study, the variable to be explained was the academic achievement of students who completed the sixth grade of primary school. In this regard, the mathematics domain was chosen because it corresponds to one of the core and fundamental subjects in the Mexican primary school curriculum. Likewise, the different assessments of academic achievement in Mexico have included mathematical competencies as central elements in evaluating learning, considering the factors associated with learning and achievement, such as socioeconomic and cultural factors of families and background schools, family support for their children's learning, among others (Bazán et al., 2016; García et al., 2017; González and Treviño, 2018; Rodríguez and González, 2018; Díaz-López and Kong-Toledo, 2020; Grijalva et al., 2020, Osuna, 2020).

Method

Participants

The participants consisted of 142 students and their fathers or mothers (one per student, sixty-five men, and seventy-seven women). The students, aged between 11 and 13, had completed the sixth grade of primary school. A total of sixty-six students came from an indigenous school in a rural area of the indigenous Municipality of Xoxocotla. Likewise, seventy-six students came from an

urban school in the Municipality of Cuernavaca. All participants were from the State of Morelos, Mexico.

Regarding the parents' or guardians' educational attainment, 3% reported having no formal education, 26% having attended primary school, 21% having attended secondary school, and 17% having attained high school or pre-university education. Only 18% of the parents or guardians had higher education (university), and 7% had graduate education. Sixteen percent of the parents did not report their educational attainment.

Schools from two different sociodemographic contexts participated in the study. Figure 1 shows the physical environment of a neighborhood in the indigenous community where one of the two indigenous schools was located. Most of its streets have no sidewalks or are not paved, and some families still live in houses made of handmade materials: *quinchas*, straw, adobe, and rustic wood. Its inhabitants belong to the Nahua ethnic group, and most of them speak Nahuatl language. The schools are situated in an area with a high rate of marginalization, social vulnerability, and remarkably high levels of social risk, characterized by lack of opportunities and reconstruction of the social environment, as reported by the National Institute of Geography and Statistics (INEGI, 2015).

Source: http://launidadmorelos.blogspot.com/2011/09/espacios-morelenses-cuentepec-morelos.html y https://enserionoticias.com.mx/2017/10/25/regresan-a-clases-escuelas-tradicionales-de-cuernavaca/

Figure 1.
Visual sample of the rural community (left) and the urban neighborhood (right) of the participating schools.

For the urban *context*, the two schools in the Municipality of Cuernavaca are situated in low marginalization and low social risk areas, in two traditional neighborhoods where students from middle socioeconomic status families live. Figure 1 also shows the urban area of one of the schools in the urban context. In general, families live in private houses or apartments in buildings near the schools. All streets have sidewalks and are paved. They also have traffic signs. The main roads have traffic lights for vehicles and pedestrians to cross.

Study Design

A non-experimental cross-sectional study was conducted using a mixed explanatory design with manifest and latent variables (Ato et al., 2013). It used structural equation modeling to analyze the effect of sociodemographic context variables of schools, educational attainment, and parental support, on performance in mathematics.

Variables and Instruments

School sociodemographic context

This variable refers to the students' physical, social, and demographic contexts (urban or rural primary school) and the *type of school system* (*urban or indigenous public*). We built a School Context index to differentiate students according to their background and the type of school: a) Students living in an urban context attend a regular public school in an urban area (Cuernavaca). Their lessons are taught in Spanish. b) Students living in a rural context attend schools under the indigenous education system in a rural area (Xoxocotla or Cuentepec). Their lessons are taught in Nahuatl (first language) and Spanish (intercultural bilingual schools). For the structural equation modeling, the urban context was established as a reference value (0), while the rural context was coded for identification and interpretation (1).

Parents' educational attainment

Parents' educational attainment was examined using two questions: one was included in the sociodemographic form filled out by each student, and the other one appeared in the family support questionnaire filled out by the father, mother, or guardian. The students were asked to mark with an X the highest level of education attained by (one of) their parents: No studies, Primary, Secondary, Baccalaureate, Technical, University, Graduate. Parents were asked to mark the highest level of education attained by one of them: No studies, Primary, Secondary, Baccalaureate, Technical, University, Graduate.

Family educational practices (family support for school learning).

Seven statements were adapted from the self-report scale on family support strategies by Bazán et al. (2016) to gather information on the educational practices used by parents to support their children in learning mathematics at home. This is a Likert-type scale, with values ranging from Never = 0, to Always = 4. A latent factor, *Family Support*, was formed with the following statements:

1. When my child has an exam, I ask him/her questions from his/her books to find out if he/she knows how to solve it.
2. When my child has an exam, I help him/her by doing exercises together on the lessons studied in class.
3. When my child has an exposition or presentation at school, I ask him/her to show me how he/she will do it.
4. I teach my child to find his/her own information to complete the homework.
5. I teach my child different ways to study.
6. I answer his/her questions before an exam or exposition.
7. I verify whether my child understands what he/she is studying or doing.

The scale showed good convergent construct validity and reliability. A confirmatory factor analysis model was obtained using the EQS 6.4 program with acceptable goodness of fit: Chi-square = 74.79, $p < .01$, Comparative Fit Index (CFI) = 0.97, Bentler-Bonett Normed Fit Index = 0.96, Root Mean Square Error of Approximation (RMSEA) = 0.09. In addition, good reliability indices were also obtained: Cronbach's Alpha Coefficient = 0.88; Rho Reliability Coefficient = 0.88; Weighted Maximum Internal Consistency Reliability = 0.89.

Achievement in mathematics

Mathematics achievement was examined using an eight-question questionnaire, which evaluates two competencies or skills according to the official sixth-grade Mathematics curriculum:

a) Communicating mathematical information, which included four questions:

1. Expressing, understanding, and interpreting mathematical information included in the situation “The Cartoons.”
2. Deducing information derived from representations, inferring properties, characteristics, or patterns, and establishing relations within the situation entitled “The Cartoons.”
3. Expressing, understanding, and interpreting mathematical information included in the example situation “The Basketball Team.”
4. Deducing information derived from representations, inferring properties, characteristics, patterns, and establishing relations within the situation entitled “The Basketball Team.”

b) Managing techniques efficiently (independent mathematical problem solving), which includes four questions:

1. Identifying, establishing, and solving various kinds of problems or situations in the "Khalifa Tower" (Solving different problems).
2. Asking a question, identifying data, and performing operations to solve the "Khalifa Tower" (Asking questions).
3. Identifying, establishing, and solving diverse types of situations "Something from history" (Solving various problems).
4. Asking a question, identifying data, and performing operations to solve "Something from History" (Asking questions).

The questionnaire has acceptable convergent and divergent construct validity. The goodness of fit for the hypothetical model was moderate: Chi-square = 228.898; $p < .01$; Comparative Fit Index (CFI = 0.92; Bollen’s Incremental Fit Index (IFI) = 0.92. However, the Root Mean Squared Error (RMSEA) was greater than = 0.09, and the reliability coefficients were good: Cronbach's Alpha = 0.82; Rho Reliability Coefficient = 0.84.

Procedure

The students completed the mathematical skills assessment and a family sociodemographic form. The instruments were applied in a classroom at their schools with prior authorization and informed consent signed by the families. In addition, the parents (father, mother, or guardian) completed a seven-statement Likert-type scale on the strategies used to support their children's school learning.

Data Analysis

Descriptive analyses of the parents’ educational attainment according to the different school contexts were conducted with the SPSS 24 statistical program. In addition, the validity and reliability indices of the measurements were calculated for the variables of family educational practices (Family Support) and mathematical competencies in sixth grade of primary school, using the EQS 6.4 program.

A structural regression model was assessed using the EQS 6.4 program to analyze the relations between two manifest variables (School Context and Parents’ Educational Attainment) and two latent variables (Family Support and Mathematics Achievement). Mathematics achievement (with two indicators) was the predicted variable. This model assumes that the school context directly impacts parents’ educational attainment, family support practices for their children's academic learning, and academic achievement. In addition, the model assumes that

family support directly impacts mathematics achievement and is, in turn, explained by the parents' educational attainment.

Before conducting the structural equation model analyses, it was convenient to determine whether the number of participants was appropriate to run the models. Although Kline (2011) suggests sample sizes of 200:5, or 10:1. Authors like Sideridis et al. (2014) maintain that acceptable fit values were obtained using a sample of 70-80, even with thirty participants.

Results

School Contexts and Parents' Educational Attainment

Table 1 shows the parents' educational attainment according to school contexts, considering only the 122 parents that provided information on their educational attainment. Thirty percent of the parents with primary education or less corresponded to the rural indigenous context; in turn, only 3% of the parents with primary school came from urban public communities. None of the parents in the rural indigenous context had technical or university education, in contrast to the 22% of the participants who studied technical or university degrees, which corresponded to the urban context.

Table 1.
Parents' educational attainment according to school context

Parents' educational attainment	School context		Total
	Urban public	Rural indigenous	
0 No formal education	0	4	4
	0.00%	3.30%	3.30%
1 Primary	4	33	37
	3.30%	27.00%	30.30%
2 Secondary	14	16	30
	11.50%	13.10%	24.60%
3 High school	21	3	24
	17.20%	2.50%	19.70%
4 Technical or university	26	0	26
	21.30%	0.00%	21.30%
5 Graduate	1	0	1
	0.80%	0.00%	0.80%
Total	66	56	122
	54.10%	45.90%	100.00%

Note: Percentages (%) were calculated from the 122 parents who answered the question about educational attainment.

Table 2 shows the average of the latent factors of Achievement in mathematics and Family support according to school contexts and the average of the indicators that make up these factors. The data were obtained from the answers from the 142 students and 122 parents who answered the questions that make up these factors. It should be noted that the factors are not observable, so the averages of the various questions (indicators) that make up them were obtained for their estimation. The parents of students attending rural indigenous schools report less activity in the particular indicators and the overall factor of Family Support in their children's academic activities, as opposed to what occurs with parents in urban schools. Conversely, the results obtained show that, on average, the students from urban environments had higher averages in each indicator and the overall factor of Achievement in mathematics than their counterparts from indigenous schools.

Table 2.
Achievement in mathematics and Family support indicators according to school context

Indicators/Latent factors	Mean	(E.E.)	S.D.	Min.	Max.
	Urban Context				
Mathematical Competencies					
Communicating information	1.11	(0.09)	1.13	0.00	4.00
Problem-solving	0.61	(0.08)	1.02	0.00	4.00
Total, Mathematics achievement by students	0.86	(0.07)	0.85	0.00	4.00
Family Support					
Book information	2.36	(0.11)	1.07	0.00	4.00
Exercise/Support on Classroom Content.	2.24	(0.12)	1.17	0.00	4.00
"Show me how he/she does it."	2.96	(0.11)	1.07	0.00	4.00
Finding own information in homework	3.20	(0.10)	0.95	0.00	4.00
"I teach different ways to study."	2.81	(0.11)	1.05	1.00	4.00
Examining the questions	2.54	(0.11)	1.11	0.00	4.00
The child understands what he/she is studying	1.67	(0.13)	1.22	0.00	4.00
Verifying child's understanding	2.90	(0.10)	1.02	0.00	4.00
Total, parents' performance in Family support	2.57	(0.08)	0.77	0.63	4.00
	Rural Indigenous Context				
Mathematical Competencies					
Communicating information	0.80	(0.07)	0.98	0.00	4.00
Problem-solving	0.62	(0.06)	0.82	0.00	4.00
Total, Mathematics achievement by students	0.71	(0.05)	0.67	0.00	4.00
Family Support					
Book information	2.24	(0.11)	1.10	0.00	4.00
Exercise/Support on Classroom Content.	2.23	(0.11)	1.12	0.00	4.00
"Show me how he/she does it."	2.72	(0.11)	1.08	0.00	4.00
Finding own information in homework	3.00	(0.11)	1.07	0.00	4.00
"I teach different ways to study."	2.60	(0.12)	1.18	0.00	4.00
Examining the questions	2.38	(0.12)	1.18	0.00	4.00
The child understands what he/she is studying	1.59	(0.13)	1.30	0.00	4.00
Verifying child's understanding	2.88	(0.10)	1.05	0.00	4.00
Total, parents' performance in Family support	2.49	(0.08)	0.82	0.38	4.00

Note: The values were calculated from the answers from 142 students and 122 parents who answered the questions

Structural Relations between Context, Parental Support, and Academic Achievement

Figure 2 shows the results of the structural regression modeling, taking the latent factor of Achievement in mathematics as the predictor variable, which was formed by the scores obtained in Communicating Mathematical Information and Managing Techniques Efficiently. It is noteworthy that all the indicators of the latent variable of Family support show significant coefficients (with values ranging between 0.53 and 0.75), which is a manifestation of convergent construct validity. Likewise, the figure shows that the rural school Context only adversely influences (-0.72) the Parents' educational attainment, which in turn impacts Family support (0.25), and the latter variable, on Academic Achievement (0.25). This model did not allow us to confirm a direct effect of the Background context variable on the variable of Achievement in mathematics.

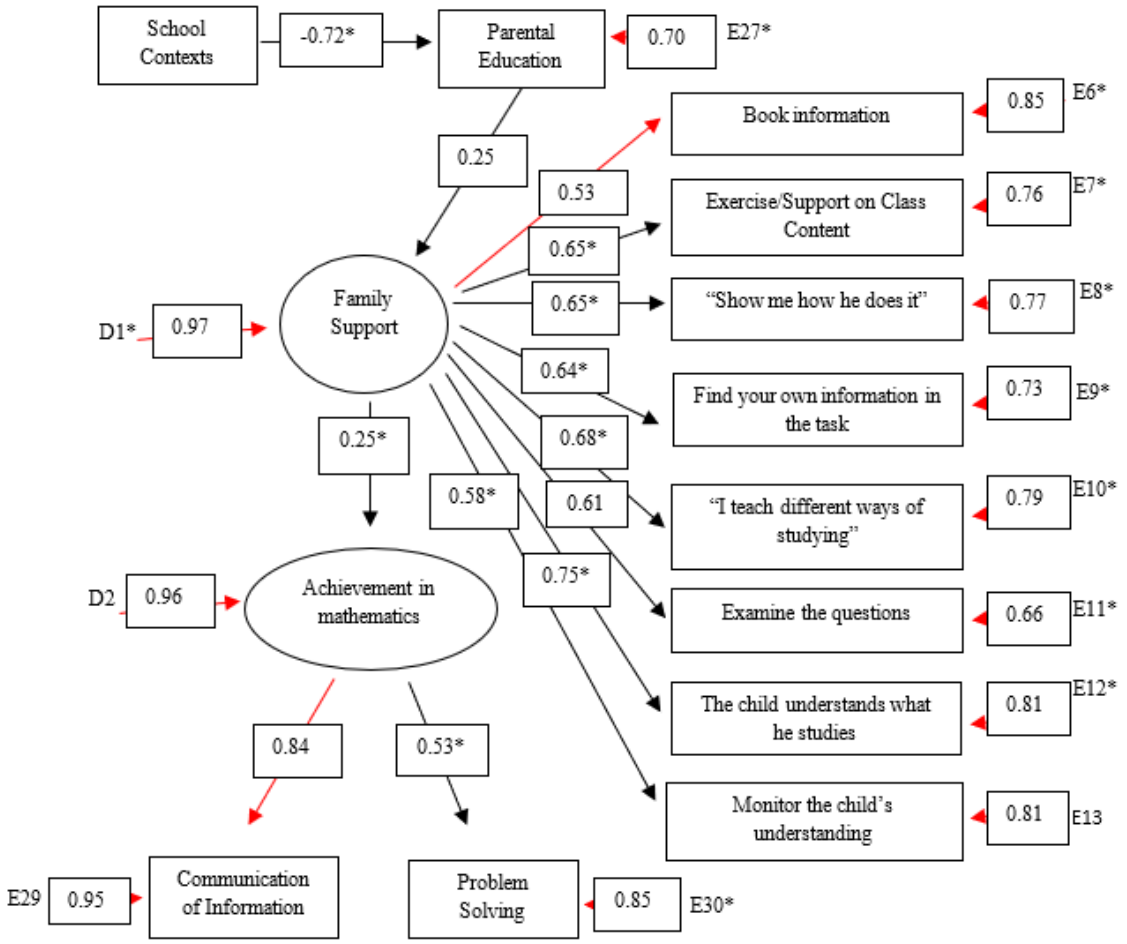

Figure 2.
The resulting structural regression among context, family, and achievement in mathematics variables.

Nevertheless, we obtained a model with acceptable goodness of fit for the hypothetical model assessed (Chi-square = 60.20, *P* = 0.04, CFI = 0.95, RMSEA at 0.06). These results clearly express specific relations between (rural) Background context and Parents' educational attainment (significant but negative relation), between Parents' educational attainment and Family support (positive and significant relation), and Family support and Achievement in mathematics (positive and significant relation). Taking into account the latent or composite nature of the variables of Family support and Academic achievement and the valid convergence in

constructs, it is understood that a significant effect of any predictor variable on these variables also implies relations between these variables and the indicators of such latent variables, contributing to a more complete explanation among variables (whether manifest or latent), which is one of the advantages of structural regression models, such as the one used here.

However, an attempt was made to lower the significance level to have a P > 0.05 and establish a relation between the background context and academic achievement. Therefore, the specifications of the resulting model were modified, establishing the direct effect of the manifest variable of Rural context on the manifest variable of Communicating mathematical information, and not on the latent variable of Achievement in mathematics.

Figure 3 shows the result of the modified structural regression model, which obtained good goodness of fit for the hypothetical model (p > .05, CFI = 0.96, RMSEA at 0.06). Again, the strong negative relation between the Rural school context and the Parents' educational attainment, and the positive relation between the latter variable and the variable of Family support can be seen.

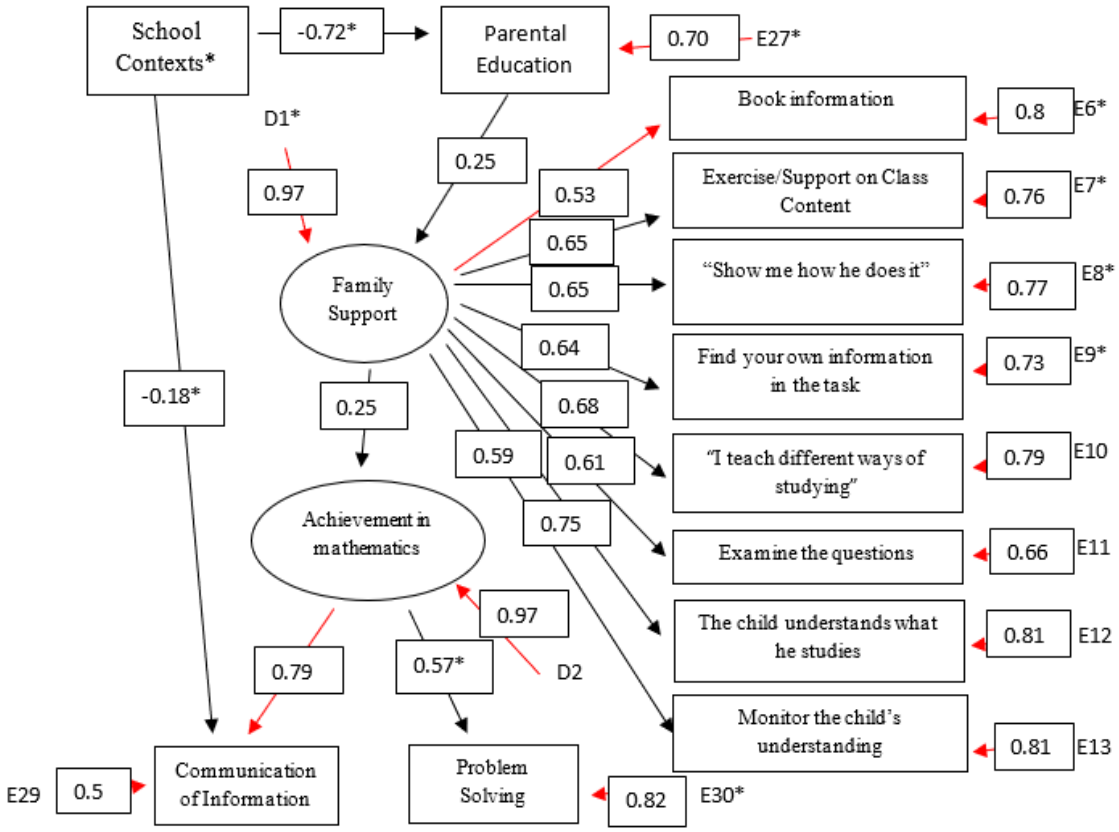

Figure 3.
Modified structural regression model among context, family, and achievement variables.

There is a positive relation between Achievement in mathematics sand Family support. In this regard, it should be noted that the background context also has a low and negative relation with one of the simple variables of Achievement in mathematics (Communicating information). In general, it can be observed that the structural regression coefficients among the variables involved did not change compared to the coefficients of the model reported in Figure 2. Although, the model in Figure 3 is more robust and shows better goodness of fit.

Discussion

The results of this study highlight that the population with lower educational resources is that living in rural demographic contexts, which also corresponds to indigenous communities in Morelos. Although the physical context by itself does not determine the lowest level of educational and cultural resources, it can be affirmed that there are complex interactions between physical and geographic places and spaces. It would determine that the deepest poverty would be associated with socioeconomic and education limitations, as Delprato (2019) found.

It is the case for people living in rural areas and from indigenous ethnic groups whose children attend schools under the indigenous education system and not private or regular urban schools. These people are even in constant exposure to economic and demographic segregation that will perpetuate education gaps attributable to variations in the environment where they live (Reardon et al., 2017) beyond the individual, family, and school characteristics (Pearman, 2017).

Likewise, external observation of school environments and location allowed the collection of information on aspects related to school infrastructure and physical facilities. It also confirmed the presence of worse conditions in centers in rural indigenous communities compared to those in urban ones. These data are consistent with those from population censuses in Mexico (INEGI, 2015) about indigenous communities in a situation of greater vulnerability to environmental disasters, more limited education opportunities, and the existence of health and social risks. As maintained by Boccaletti et al. (2018) and Skevington (2010), the joint consideration of the interrelated effects of social, economic, and environmental conditions offers a better understanding of the factors that affect the quality of sustainable human development, with education and learning indicators being ones of the most important.

In line with what has been reported by different authors (Backhoff 2011; Blanco, 2017; Hernández-Zavala et al, 2006; Santibáñez, 2016), the results of this study highlight the relations between academic achievement and the background context of the families. Thus, the resulting structural regression model stated negative and significant relations between school context and the results in one of the mathematical competencies assessed. Students from rural indigenous schools showed lower achievement in communicating mathematical information, which involves curricular competencies (understanding, interpretation, oral expression, relation acquisition, and crucial patterns in information) that account for main cognitive skills for school learning.

The results of the structural regression models assessed also show indirect relations between parents' educational attainment and their children's academic performance, mediated in a relevant way by family strategies to support learning (e.g., solving exercises with the children, teaching them study strategies, jointly analyzing the curricular content taught in class, verifying the children's understanding, etc.)

As in Altschul's (2012) study, parental involvement in education (activities developed at home to help students with their school learning in Mathematics) was the crucial mediator between the influence of the demographic, social and educational contexts, and their children's academic results in Mathematics. This results in this study also acknowledge that family educational practices can be an essential complement to school learning regardless of the background context (rural or urban). These family support strategies, or what Bazán et al. (2010) call "school support," are, in turn, significantly influenced by parents' educational attainment, i.e., this effect is sensitive to the educational environment at home and the cultural potential of the parents. The results also suggest that these parents would have diverse ways of supporting their children, which does not depend on their educational attainment only. For example, almost 30% of the parents in the rural indigenous context had received no formal education or had only primary education, while none of them had technical or university education.

Conclusions

The findings in this study are consistent with the results in the Tests of Primary, Secondary, and Higher Education in Mexico (PLANEA, 2016), which found that students in private contexts and public schools in urban contexts have better achievement levels in academic performance tests. Backhoff (2011), Blanco (2017), and Santibáñez (2016) reported low achievement and school performance in students from socio-demographically disadvantaged areas, such as rural and indigenous contexts. According to these studies and those conducted by Hernández-Zavala et al. (2006), students under the indigenous education system show worse learning and academic performance indicators than their counterparts in urban public schools (located in Cuernavaca, the capital of Morelos).

Likewise, the findings in this study highlight that students' complementary learning opportunities significantly depend on the cultural capital of their families, which, in turn, is determined by their demographic environment. Other studies show that if parental support for children's education entails strategically effective interventions for children, it can reduce the potential education gaps in higher education levels (Bierman et al., 2019; Iruka et al., 2018).

Beyond the findings obtained by large-scale assessments in different countries, there is still a lack of research focused on deep and comprehensive approaches to the relations between the different dimensions and values of environmental factors and their influence on educational practices that involve parents in children's education. Consequently, future research in the field that contributes to a more holistic understanding of the quality of education and human development is needed.

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