

Impact of Socioeconomic and Macroeconomic Conditions on the Financial Literacy of Students Assessed by Pisa

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Abstract

This study aimed to investigate the relationship between students' performance on the PISA financial literacy test in 2012, 2015, and 2018, with the socioeconomic characteristics of the participants and macroeconomic indicators of their countries of origin. The average PISA performance in financial knowledge of students from 30 OECD member and partner countries in the years was analyzed. Based on mean difference tests and multivariate panel regression models, it was concluded that the socioeconomic and macroeconomic context in which the student is inserted is directly related to their financial knowledge. Students who were native, economically favored, and residents of large cities showed better performance and a statistically higher average score compared to immigrant students, low-income students, or residents of medium or small cities. It was also found that the financial performance of these students is impacted by the countries' income inequality indices, negatively influencing those with the worst distributions.

Keywords: financial education, PISA, socioeconomic influence, OECD

1. Introduction

Analyzing different economic scenarios, we perceive an increase in the importance attributed to financial education for the full exercise of rights and how this knowledge, or its lack, can influence individuals' decision-making. Changes in social and economic aspects, such as the increase in the life expectancy of the population and the increase in the number of families belonging to the middle class, have helped to make this issue more evident (OECD, 2005a).

Araújo and Souza (2012) highlight the importance of promoting financial citizenship, which includes broader access of the population to markets and financial education, as well as the duty to fulfill their monetary obligations. When citizens exercise their rights and fulfill their duties, they contribute to development and increase the efficiency and solidity of markets. Furthermore, the democratization of this area of knowledge increases private savings in the long term and makes people use financial products more efficiently and sustainably.

To better understand the importance of financial education in the lives of economic agents, it is essential to define the term studied. According to the OECD (2005a), financial education is the learning process of consumers and investors who, through information, instructions, and/or advice, can more assertively analyze the financial risks and opportunities they will be subjected to, thus improving their financial well-being.

Braunstein and Welch (2002) understand that, in addition to personal benefit, financial education favors the development of the financial market and economic growth, as it stimulates the supply of better services. As they state, "informed participants help create a more competitive and efficient market, and aware consumers demand products that meet their short- and long-term financial needs" (Braunstein & Welch, 2002, p. 445).

Financial education has been highlighted in academia in topics such as the relationships between human behavior and financial knowledge and their influences on consumption decisions (Amadeu, 2009), as well as in studies on financial mathematics teaching and its methods (Herminio, 2008; Oliveira, Rosetti Junior, & Schimiguel, 2012). It has also gained notoriety for highlighting its importance in building financial concepts during the citizen's development and in studies that analyze the level of financial literacy of students (Carlo &

Carvalho, 2019; Moreira, 2019; Santiago, Domingos, & Silva, 2018). One of the most prominent aspects is the one that addresses the importance of financial literacy, as it seeks to understand the social and economic consequences of financial knowledge in society (OECD, 2013b; Wisniewski, 2011; Araújo & Souza, 2012; Braunstein & Welch, 2002).

Carlo and Carvalho (2019) analyzed the 2015 PISA (Programme for International Student Assessment) results, using the measurement on levels 1 to 5, where 1 indicates lower financial knowledge and 5, higher. The authors concluded that 75% of Brazilian students who participated in the assessment are classified in the two lowest levels of this scale and have the lowest percentage of representatives at level 5 of knowledge, demonstrating the clear inefficiency of the approach to teaching this subject in Brazilian basic education.

In this sense, considering the scenario presented, this work proposes the following research question: is there a socioeconomic influence on the performance of students assessed in the PISA 2012, 2015, and 2018 financial education tests?

To answer this question, the objective of this work is to analyze the relationship between students' performance on the financial literacy test in the PISA 2012, 2015, and 2018 and the socioeconomic characteristics of the participants and macroeconomic indicators of their countries of origin.

2. Financial Literacy and Financial Education

Although the focus of this research is directed towards the term Financial Education, a brief introduction to the terms Financial Literacy and Financial Education is relevant. There are several constructs used to define these concepts, and they are often equated in the literature. However, the two terms are distinct, although complementary.

According to Huston (2010), the term Financial Literacy has often been used synonymously with Financial Education or financial knowledge. Few researchers have attempted to define or differentiate these terms. The author points out that if these two constructs are conceptually different, using them interchangeably can lead to confusion. Understanding the conceptual differences between these concepts allows them to be measured more consistently, since, according to Atkinson and Messy (2011), Financial Literacy goes beyond Financial Education.

Therefore, Financial Literacy is defined by the OECD (2013b) as a combination of awareness, knowledge, skills, attitudes, and behaviors necessary for individuals to make financial decisions and ultimately achieve their financial well-being. On the other hand, Financial Education can be defined as a process by which individuals and societies improve their understanding of financial concepts and products through clear information, training, and guidance. Thus, this knowledge allows people to acquire the values and skills necessary to become aware of risks and opportunities, leading to better choices. In this sense, Financial Education can be classified as a process that consistently contributes to the formation of more responsible individuals and societies (OECD, 2005b).

Potrich, Vieira, and Paraboni (2013) acknowledge that financial knowledge is the essential basis of Financial Education. However, Financial Literacy, in addition to encompassing financial knowledge, also involves financial behavior and attitude. The authors highlight that the terms Financial Literacy and Financial Education are distinct and that, if used as synonyms, they can lead to misunderstandings.

For Messy and Monticone (2016), Financial Education can be understood as financial knowledge, being an essential complement to the protection and financial inclusion of consumers. Therefore, there should be efforts to improve it to support economic growth in any global economy.

Financial knowledge plays an important role in social development, as saving means abstaining from something at the moment to improve future living standards, allowing the individual to achieve greater goals in the long term (Bruni, 2005). It is indispensable for the organization of personal finances and positively affects the habit of saving and access to various investment modalities (Wisniewski, 2011). The author also highlights that the high level of indebtedness of Brazilians makes access to this training essential. Many financial decisions involve credit options, financing, loans, and consortia, and ignorance of these products and the analysis of their differences can lead to high levels of indebtedness (Savoia, Saito, & Santana, 2007).

Financially educated consumers, with their short- and long-term demands, stimulate the market, contributing to the development of new products and services that meet them (Braunstein & Welch, 2002). In addition to stimulating new markets, financial knowledge also better prepares citizens for times of crisis. Alves, Rodrigues, Costa Filho, Maciel, and Almeida (2020) complement by stating that the lack of culture and budget control leads many families to indebtedness and that financial education should be used as a mechanism to address personal finances and be implemented from childhood to adulthood. Campos, Teixeira, and Coutinho (2015) state that the

topic must be addressed according to the reality of the students, and for this, the teacher must be adequately prepared for the challenge. The school should provide the tools, skills, and contexts necessary for the development of critical thinking, allowing students to make their choices appropriately (Teixeira, 2017).

Bernheim, Garrett, and Maki (2001) state that, between 1957 and 1985, almost 60% of US states (29 out of 50) already included financial education as a mandatory subject in their high schools, intending to prepare young people for adult life. According to Savoia, Saito, and Santana (2007), in the United States, the subject is mandatory in the curriculum of some states, and 72% of banks are involved in financial education programs. In England, the subject is not a regular discipline, but it is addressed in subjects such as mathematics, moral and civic education, among others. In Brazil, financial education is in less developed stages, and actions are generally aimed at adult consumers or those interested in the financial market.

Basic Education in Brazil is governed by the National Education Guidelines and Bases Law (Brasil, 1996) and establishes a National Common Curriculum Base (BNCC) for this stage of education. According to Brasil (2018), the BNCC defines the essential learning of students. Regarding Mathematics in Elementary School (from 1st to 9th grade), the BNCC divides this area into five: Arithmetic, Algebra, Geometry, Statistics, and Probability, highlighting the teaching of financial education. The content offered seeks to develop skills in organizing and interpreting data in different contexts, addressing basic concepts of economics and finance, such as profitability and liquidity, interest rates, and inflation, from the early years, to train citizens capable of making judgments and making appropriate decisions.

It is noteworthy that the idea of the authors cited is aligned with the vision of world leaders and the OECD, who, at an event held in Brazil in 2009, reaffirmed that “the goal of increasing the financial knowledge and skills of students and children in school has become a high priority, as well as an important challenge for policymakers around the world” (OECD, 2010, p. 6). At this event, the parameters that should guide financial education actions in schools were announced: [...] it should preferably be developed through a planned and coherent program, receive adequate resources, involve rigorous evaluation, be offered as early as possible, be included in the school curriculum as a mandatory element (as a subject or incorporated into other subjects) and focus on the development of attitudes, skills, financial knowledge, as well as responsible financial behaviors. (OECD, 2010, p. 6).

To achieve these objectives, in December 2010, Presidential Decree No. 7,397, later revoked and replaced by Decree No. 10,393, of June 9, 2020, created the National Financial Education Strategy (ENEF) (Brasil, 2020). The construction of a National Financial Education Strategy enables the promotion of the subject in the country, creating guidelines to guide concrete initiatives, whether from the State, the private sector, or civil society. The strategy becomes the main reference for laws, public policies, and multisectoral programs, contributing to generating broad mobilization. In 2017, 60 countries with different income levels had a national Financial Education strategy or made progress in projects related to the subject (Brasil, 2017).

This program uses partnerships with public and private agents to multiply the reach of its actions, which include portals on the Internet, lectures, publications, seminars, competitions, telephone service, courses, TV programs, fairs, and cultural spaces, among others. It is directed at three distinct audiences: children and young people, with a focus, and adults. The pedagogical model was developed to promote thinking in financial education from the early years of education, connect areas of knowledge outside the formal context, and develop the ability to decide and plan autonomously and healthily (OECD, 2013a).

Financial education has gained notoriety for stimulating individual participation in society more broadly, as the knowledge acquired helps in decision-making and personal finance management, increasing the individual's control and understanding of their actions (Savoia, Saito, & Santana, 2007). This concept goes beyond learning to save, control expenses, save, and accumulate wealth, as it is also an opportunity to stabilize financial life and thus improve quality of life (Matias, 2018). Furthermore, financial literacy is essential for a successful life (Potrich, Vieira, & Kirch, 2015).

However, it is important to emphasize that, although the universal implementation of Financial Education is fundamental for individual and social development, it faces a series of obstacles in its implementation that can vary according to the local context and the characteristics of the population. These obstacles include socioeconomic inequalities, complexity of content, cultural and behavioral factors, technological barriers, as well as difficulties in financing and sustainability.

At the international level, the main reference in the development of content and validation of Financial Education experiences is the Organization for Economic Co-operation and Development (OECD) (Cunha, 2020). The OECD's first steps in this field of study began in the early 2000s and, later, with the creation of the

Financial Education Project in 2003, in response to the concern shown by member countries with three processes underway at the time: the increase in workers retiring in a scenario of decreasing social security coverage provided by states and employers; the increase in indebtedness due to easier access to credit and unregulated financial markets; and the increase in electronic transactions, with social groups outside the banking system (OECD, 2005a).

In 2008, during the financial crisis, other actions gained new momentum with the creation of the International Network on Financial Education (INFE), a network formed by specialists and representatives of public institutions from various countries (members or not), intending to collect data to identify good practices and produce recommendations and national policy management instruments (Forte, 2021).

Over the years, several initiatives have promoted the discussion and implementation of this topic of global interest. Global and regional forums, such as the G20 and the Asia-Pacific Economic Cooperation (APEC), have already recognized the importance of national Financial Education efforts to sustain economic and financial stability and inclusive social development (Brasil, 2017).

2.1 Studies on Financial Education

Studies on financial education can be broadly divided into three main groups: teaching methods (Villada, López-Lezama, & Muñoz-Galeano, 2017; Bendavid-Hadar & Hadad, 2013), student performance (Carlo & Carvalho, 2019; Moreira, 2019; Santiago, Domingos, & Silva, 2018), and the impacts of financial education on people's lives (Silva & Selva, 2019; Wang & Hu, 2018).

Villada, López-Lezama, and Muñoz-Galeano (2017) discuss the importance of teaching financial education in school curricula, in addition to business courses, and the fundamental role that the teacher plays in this function. They highlight that one of the main factors of the recent global economic crises is the lack of this type of knowledge, essential for improving the quality of life of citizens and states.

Lima (2024) points out that the school can and should assume the responsibility of guiding its students to identify, understand, and make conscious financial decisions throughout life. He suggests that the subject should be treated transversally, addressed in multiple disciplines of basic education, aiming to develop in students a critical sense for better decision-making (Ditta, Matos, Ignácio, & Harlow, 2023).

In research conducted with Israeli students in the second and third grades, from three schools with different degrees of religiosity and socioeconomic status, Bendavid-Hadar and Hadad (2013) revealed a low overall level of financial literacy among Israeli children. The study showed that religious students have higher financial literacy compared to non-religious students and that socioeconomically favored students exhibit a higher level than those who are disadvantaged.

Research conducted with 396 university students from the Lisbon University Institute (ISCTE-IUL) concluded that students have low levels of financial knowledge and tend to think they know more about credit than they do. Furthermore, Roquette, Laureano, and Botelho (2014) found that the student's sociodemographic profile and access to bank accounts influence the level of financial education.

Not only abroad was the performance of young people evaluated concerning their financial education. Carlo and Carvalho (2019) analyzed the performance of Brazilian students in financial competencies, based on the results of PISA 2015. The authors highlighted the weak performance of students, who, for the most part, were classified in the lowest levels, indicating a probable inefficiency of the approaches to mathematics and financial education applied in national education.

Campos (2013) worked with high school students, seeking to understand how they would respond to proposed problem situations, such as, for example, their attitudes when receiving a value saved by their parents throughout their lives. The author concluded that, in addition to working with the individual to consume better, it is necessary to educate them so that they can make more informed decisions in general.

Baroni, Silva, Maltempi, and Javaroni (2019) conducted a study on how computational thinking influences financial decisions. They concluded that computational thinking helps develop strategic reasoning when analyzing viable options and choosing the most advantageous alternative. Campos and Coutinho (2019) followed a critical approach to financial education, analyzing the calculation of real interest rates and promoting more in-depth discussions on the proposed topics, overcoming the initial mathematical approach.

Bernheim, Garrett, and Maki (2001) showed that financial education policies have gradual effects on consumers. Policies adopted over the past forty years, which included instructions on budgeting, credit management, saving, and investing, significantly increased students' exposure to financial curricula and, consequently, asset

accumulation when they reached adulthood.

It is observed that financial education has gained the attention of banks, governments, consumers, and other organizations in recent years, as informed participants create a more efficient and competitive market. When consumers began to demand products that met their short- and long-term financial needs, competition was established among suppliers to create products that best met these demands. However, with the increase in the number of providers and financial programs, issues such as “when”, “how”, “where”, and “for whom” are carried out, in addition to the information presented, have become major challenges for the developers of these programs.

Wang and Hu (2018) stressed that financial education in China started late and did not keep pace with economic and social development in some regions, especially in the central and western regions. Strengthening the financial and business education of university students has been elevated to the national strategic level, showing the importance of financial education knowledge. However, these young people face difficulties with access to credit, which reduces the financial self-confidence of entrepreneurs. Evidence shows that financial education increases self-confidence in finance (Imarhiagbe, Saridakis, & Mohammed, 2017).

In an analysis of students of the Accounting course at a private university in Rio de Janeiro, Alves, Silva and Bressan (2011) concluded that 74% of the participants were positioned at the lowest level of financial education, considered inadequate for students with a background in finance, which can hinder decision-making in this field.

Matta (2007) conducted a comparative study of the information offered by the Financial Education Program of the Central Bank of Brazil about the demand for university students in Brasília. A partial misalignment was found between expectations and reality, with topics such as retirement and investments being addressed superficially.

Wisniewski (2011) highlights the importance of a well-structured financial life and the popularization of the stock market in Brazil as crucial for the country’s economic sustainability. Campos, Rodrigues, and Venditti (2019) analyzed the mathematical calculations involved in investments in government bonds, from opening an account with a brokerage firm to analyzing returns.

Melo (2019) highlighted the relationships between education and financial mathematics, emphasizing the importance of the teacher’s role in conducting the subjects in the classroom. Souza and Santos (2019) observed how the Price system and legal controversies influence students’ critical positioning, analyzing concepts of table construction by high school teachers and their social impact.

Hermínio (2008) developed a project to understand the arrangement of financial mathematics content in textbooks and the opinion of teachers who use them. The author also proposed a new perspective focused on problem-solving, analyzing the social reflections awakened by the new approach. Silva and Selva (2019) highlight that the teacher’s role goes beyond disseminating the concepts foreseen in the teaching program or in the national financial education strategy. It is essential that the teacher also assists in the formation of the student’s critical thinking, relating the concepts of the didactic material with examples from everyday life and stimulating reflections and discussions about these concepts.

3. Method

This study aims to analyze the relationship between the performance in financial knowledge of students participating in PISA, in the years 2012, 2015, and 2018, their socioeconomic characteristics, and macroeconomic indicators of their countries of origin. The sample includes students from 30 countries, members, and partners of the OECD. It was observed that some countries participated in only one edition, such as Colombia, and others participated in all three editions, such as Australia. Canadian provinces were present in 2015 and 2018, while Chinese regions participated in 2012 and 2015, as presented in Table 1. This information was obtained from the report developed by the Organization for Economic Co-operation and Development (OECD, 2020), which analyzed the performance of the participating countries of the organization and guests.

After collecting the average performance per country in financial knowledge, corresponding socioeconomic data was compiled. The selected variables were: the Gini index, which measures income distribution inequality; gross domestic product divided by the population (GDP per capita); unemployment rate; and HDI (Human Development Index) of the years analyzed – 2012, 2015, and 2018. Data on the Gini index, GDP per capita, and unemployment rate were obtained from the World Bank database (Banco Mundial, 2020), while the HDI was obtained from the website of the United Nations Development Programme (United Nations Development Programme, 2020).

In addition to the selected socioeconomic variables, the Organization for Economic Co-operation and

Development (OECD, 2020) report includes other cultural and social variables expressed in the average of participants, which were added to the study. Among them are the performances of boys and girls, of economically advantaged and low-income students, and of immigrants and natives, allowing for a comparative analysis between the averages presented by these groups. The average performance of students from schools in small, medium, and large cities was also selected, adding more elements to the study.

To identify the existence of statistically significant differences in the average financial literacy performance of students, descriptive analyses and mean difference tests were performed for each group, separated by gender, economic status (advantaged or low-income), origin (native or immigrant), and size of the cities where they reside.

To verify the relationship between socioeconomic variables (Gini index, GDP per capita, unemployment rate, and HDI) and the final performance of countries in the PISA financial literacy assessment, a multivariate panel regression model was used. This model was chosen because panel data allows for the evaluation of the relationship of performance variables, making it possible to deduce possible differences between individuals over the study period (Fávero, 2013). As the database has a smaller time dimension than the cross-section, it is characterized as a short panel, which justifies the use of POLS models with clustered robust standard errors, fixed effects, random effects, and fixed effects with clustered robust standard errors, according to the same author.

Table 1. Participating countries in the PISA financial literacy test

2012	2015	2018
Australia	Australia	Australia
Belgium	Belgium	Brazil
China (Shanghai)	Brazil	Bulgaria
Colombia	Canadian provinces	Canadian provinces
Croatia	Chile	Chile
Czech Republic	China (B-S-J-G)	Estonia
Estonia	Italy	Finland
France	Lithuania	Georgia
Israel	Netherlands	Indonesia
Italy	Peru	Italy
Latvia	Poland	Latvia
New Zealand	Russia	Lithuania
Poland	Slovak Republic	Peru
Russia	Spain	Poland
Slovak Republic	United States	Portugal
Slovenia		Russia
Spain		Serbia
United States		Slovak Republic
		Spain
		United States

4. Results and Discussion

Initially, the data was separated into two tables: the first contains the performance by gender, analyzing the results of girls and boys, economically advantaged and low-income students, and immigrants, seeking to expose the difference in performance between natives and non-natives. The second table presents the comparison of performance between students residing in locations with different conditions and levels of urbanization, classified as small cities (with up to 3,000 inhabitants), medium cities (from 3,000 to 100,000 inhabitants), and large cities (over 100,000 inhabitants).

Table 2 shows that the average performance in financial literacy, grouped by gender, is similar. Students obtained an average score of 484.2 points, very close to the score achieved by female students, 486.1 points, resulting in a difference of less than 2 points. Furthermore, the mean test performed with these results showed that the values are not statistically different. These data are in line with the Organization for Economic Co-operation and Development (OECD, 2020) report, which suggests that the gender performance gap has been overcome and that there is currently a balance in this indicator. Bezerra and Kassouf (2006) also highlighted that gender is not a

determining factor in school performance in the urban and rural institutions analyzed.

The performance of low-income students in the PISA financial literacy exam presented an average of 444.58 points, while that of students considered economically advantaged was, on average, 529.32 points. This difference of 84 points reinforces the idea that income is a determining factor in school performance. In studies on the determining factors of Brazilian education (Castro, 2009) and the performance difference between public and private education (Moraes & Belluzzo, 2014), it is also possible to observe the advantage of students with better financial conditions compared to their less advantaged counterparts. With an approach focused on teaching, Teixeira (2017) highlighted the importance of questioning and contextualizing problem situations for better content retention, which tends to be more challenging for students in less favorable economic conditions. The mean difference tests performed indicated statistical significance in the difference between the two income groups, highlighting inequality as an important determining factor to be observed in education.

The difference in the mean test between immigrant and non-immigrant students in the PISA financial literacy exam was statistically significant. The average of native students was 489.67 points, while that of immigrants was 454.93 points, resulting in a difference of over 34 points, as shown in Table 2. Studies report performance differences between native and immigrant students in some countries. For example, Seabra (2008) observed a better performance of Indian immigrant students compared to native Portuguese and Cape Verdean students in basic education in Portugal. Linares (2011) also analyzed the performance of native Portuguese and students from Eastern Europe, observing a superior performance of immigrants in one of the schools evaluated. In another scenario, a study with Bolivian immigrants in the city of São Paulo found that factors such as irregularities in documentation and cultural and linguistic differences can be obstacles to the school performance of immigrant children, reflecting the precariousness of their situation (Magalhães & Schilling, 2012). These scenarios allow us to infer that the context in which students are inserted, whether of income or opportunities and study conditions, influences their performance in financial knowledge.

Table 2. Descriptive statistics and mean difference test: social indicators

		Total	Performance		
			Boys	Girls	Difference
Gender	Med	485,17	484,189	486,151	-1,962
	S.E.	4,553	6,649	6,283	
	S.D.	46,878	48,405	45,742	
	Min	476,142	470,847	473,543	
	Max	494,198	497,531	498,759	
Income			Low income	Favored	Difference
	Med	486,953	444,585	529,321	-84,736***
	S.E.	6,164	6,595	6,396	
	S.D.	63,463	48,011	46,566	
	Min	474,731	431,352	516,486	
Max	499,175	457,818	542,156		
Immigrants			No immigrants	Immigrants	Difference
	Med	473,043	489,674	454,933	34,74***
	S.E.	5,472	6,252	8,454	
	S.D.	53,052	43,764	56,71	
	Min	462,177	477,103	437,896	
Max	483,909	502,244	471,971		

Note. "Med" refers to the average of the grades to the groups achieved in the three years of PISA; "S.E", is the standard error, "D.P", is the standard deviation, "Min" and "Max" are respectively the minimum and maximum scores achieved. The symbols (***), (**), and (*) indicate significance at 1%, 5% and 10%, respectively.

In the sample collected in 2018, Brazil presented a difference of 52 points in the average performance in financial knowledge between native and immigrant students, while Portugal showed a difference of 32 points, notably smaller than that found in Brazil.

When the city averages are compared in Table 3, statistical significance is observed in the mean difference between the groups. The largest difference is found between small and large cities. Small cities achieved an average score of 478.615 points, while large cities achieved 502.019 points. In the case of Brazil, this may reflect

the long period of neglect of rural areas by the state in educational matters (Molina, Montenegro & Oliveira, 2010). Furthermore, rural areas face a low supply of financial products, and when available, they do not meet the needs of this public. As observed by Helal and Cunha (2017), bank networks offer homogeneous products throughout the national territory, ignoring the social, economic, and cultural differences of each region. According to Sanz (2010), this is not specific to a single country, also occurs widely in developed nations.

The 2018 PISA report also observes that in countries where 15-year-old students have more access to financial products, such as bank accounts and debit or credit cards, student performance in the financial assessment is higher than those who do not have access to these products or find it difficult to obtain them. Crocco, Santos, and Figueiredo (2013) confirmed this trend, stating that access to bank branches and services, as well as contact with a manager, are fundamental for greater financial inclusion. Those who do not have access to banking services are called “unbanked.” According to the authors, the phenomenon of “unbanking” can occur in two ways: through the lack of access to nearby bank branches or the absence of banking products or services suitable for the socioeconomic condition of individuals. This would explain the large difference in scores between students living in small cities and those in medium or large cities and would reinforce the view of Roquette, Laureano, and Botelho (2014) that the student’s sociodemographic profile and access to bank accounts influence the level of financial education.

Table 3. Descriptive statistics and mean difference test: demographic indicators

		Total	Performance		
			Average	Small	Difference
Small	Med	465,811	478,628	450,955	27,673***
X	S.E.	5,394	6,391	8,526	
Avarage	S.D.	52,572	45,643	56,558	
	Min	455,101	465,790	433,759	
	Max	476,520	491,465	468,150	
			Big	Small	Difference
Small	Med	478,615	502,019	450,955	51,065***
X	S.E.	5,666	5,923	8,526	
Big	S.D.	55,511	42,713	56,558	
	Min	467,367	490,128	433,759	
	Max	489,862	513,911	468,150	
			Big	Avarage	Difference
Average	Med	490,437	502,019	478,628	23,392***
X	S.E.	4,485	5,923	6,391	
Big	S.D.	45,514	42,713	45,643	
	Min	481,542	490,128	465,79	
	Max	499,332	513,911	491,465	

Note. “Med” refers to the average of the grades to the groups achieved in the three years of PISA; “S.E”, is the standard error, “D.P”, is the standard deviation, “Min” and “Max” are respectively the minimum and maximum scores achieved. The symbols (***), (**), and (*) indicate significance at 1%, 5% and 10%, respectively.

Table 4 analyzed the impact of socioeconomic indicators - Gini index, GDP per capita, unemployment rate, and HDI - on students’ financial performance. It was observed that, among all variables, only the Gini index showed statistical significance. The Gini index measures inequality in income distribution, ranging from 0 (no inequality) to 1 (maximum inequality). The negative value associated with this indicator suggests that in countries with high social inequality, i.e., with a Gini closer to 1, student performance tends to be worse. This result is consistent with the regression performed and with existing literature. Studies such as those by Atkinson and Messy (2012) and Monticone (2010) corroborate this relationship, indicating a positive correlation between income level and the degree of financial literacy.

Although the other socioeconomic variables did not show statistical significance, they should not be neglected. As highlighted by Passador and Lopes (2014, p. 106), “the data suggest that, in addition to the issue of rurality, there are other factors, such as income, social class, and living conditions, that can influence student performance and, consequently, schools.”

Table 4. Short panel data models: determinants of financial literacy performance

Variable	Financial Knowledge					
	POLS	BE	Fixed (FE)	FE_rob	Random (RE)	RE_rob
Gini	-1,456 (0,905)	-1,952 (1,479)	-1,140 (0,786)	-1,140 (0,434)	-1,152* (0,611)	-1,152* (0,379)
GDP per capita	0,001 (0,001)	0,001 (0,002)	0,002 (0,002)	0,002 (0,002)	0,002 (0,001)	0,002 (0,001)
Unemployment	-1,297 (1,011)	-1,893 (2,351)	1,277 (2,175)	1,277 (1,669)	-0,029 (1,230)	-0,029 (0,930)
HDI	127,094 (453,477)	34,394 (393,926)	77,703 (682,320)	77,703 (628,792)	21,870 (297,252)	21,870 (383,900)
Cons	401,821 (373,091)	496,904 (312,621)	376,153 (546,153)	376,153 (500,195)	452,439 (224,266)	452,439 (311,971)

Note. Estimates made by panel data regression. Standard errors are reported in parentheses. The symbols (***), (**), and (*) indicate significance at 1%, 5%, and 10%, respectively. The selection of models for analysis was carried out using the Breusch-Pagan (BP), Chow's F (Chow), and Hausman (Hausman) tests.

5. Final Considerations

Financial knowledge and skills have become increasingly essential in today's society. They not only help individuals play a more sustainable role but are also crucial for fueling personal ambitions and achieving stability and improvement in quality of life. In this context, understanding the relationship between the development of these skills and the cultural, social, and economic conditions of individuals is fundamental to understanding best teaching practices and their consequences for society. This understanding is directly related to the objective of this work: to analyze the relationship between performance in financial knowledge in PISA and socioeconomic and macroeconomic indicators.

From the results of the descriptive analyses and mean difference tests, it was observed that there are statistically significant differences in almost all the indicators analyzed, except between the performance of boys and girls. The results revealed notable differences in financial knowledge between natives and immigrants, low-income and economically advantaged students, as well as between those located in cities of different sizes. These results suggest that financial education actions do not reach all groups equitably or do not have the same effect on all groups.

In the analysis of the impact of socioeconomic indicators on performance in the financial knowledge test, the Gini index, HDI, GDP per capita, and unemployment rate were examined. The multivariate panel data analysis revealed a negative relationship between financial knowledge and the Gini index. This means that in countries with greater inequality in income distribution, student performance tends to be worse. This relationship may help explain the performance difference observed between students in large, medium, and small cities, as low-income people often reside in areas further away from major urban centers, where there is a greater supply of financial products and services, which is crucial for the development of students' economic knowledge.

Although, in recent years, the supply of financial products has reached more people due to digital platforms and fintechs, many people still do not have access to the internet. Furthermore, financial education often focuses on investments and savings, rather than teaching how to use money effectively to achieve personal goals. This requires joint action by banks, the government, and individuals to transform the situation.

It is important to recognize that financial education, despite being a priority for many nations, is not yet a universal priority. In many developing countries, economic constraints are a significant barrier, as financial resources are limited and investment in financial education is not considered a priority compared to the need to achieve basic levels of literacy and fundamental education. Furthermore, restricted access to traditional financial services can diminish the importance attributed to financial education. Lack of awareness of the relevance of financial education can be caused by several factors, including a scarcity of information, distrust in financial institutions, and a focus on the urgent demands of daily life.

Thus, the differences in access to financial education reveal significant economic, social, and institutional obstacles. Overcoming these disparities requires coordinated action to establish financial education as an essential component of economic and social development.

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