Revista de Investigación en Ciencias Contables y Administrativas
(Journal of Research in Accounting and Management Science)
Vol. 7, Num. 1, 2021

# Determining the level of financial literacy in high school: case study Bucaramanga, Colombia

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Recibido el 6 de septiembre del 2021; aceptado el 31 de octubre del 2021; disponible en línea el 29 de noviembre del 2021

**Abstract:** Financial literacy is well known as a crucial skill today. From an early age, people are exposed to the management of financial products, showing the deficiencies in their proper use. Therefore, this research aims to determine the level of financial literacy of high school students. To this end, an internationally validated diagnostic tool was identified to determine the level of financial literacy. This tool was applied to high school students in the city of Bucaramanga and its metropolitan area, to institutions that contemplated in their Institutional Educational Project (PEI) training in economics and finance. Based on the results obtained, the level of financial literacy of students was assessed. The results show the need to unite efforts in the implementation of financial literacy in Colombia, through the articulation of stakeholders in the development of a comprehensive educational program and the important role of parental participation in the implementation of these programs.

**Keywords:** Financial literacy, Financial education, High school education.

**JEL code:** A21; G40; G53

# Determinación del nivel de educación financiera en bachillerato: estudio de caso Bucaramanga – Colombia

**Resumen:** La educación financiera es bien conocida como una habilidad crucial hoy en día. Desde temprana edad, las personas están expuestas al manejo de productos financieros, mostrando las deficiencias en su uso adecuado. Por lo tanto, esta investigación tiene como objetivo determinar el nivel de educación financiera de los estudiantes de secundaria. Con este fin, se identificó una herramienta de diagnóstico validada internacionalmente para determinar el nivel de educación financiera. Esta herramienta se aplicó a estudiantes de bachillerato de la ciudad de Bucaramanga y su área metropolitana, a instituciones que contemplaban en su Proyecto Educativo Institucional (PEI) la formación en economía y finanzas. Con base en los resultados obtenidos, se evaluó el nivel de educación financiera de los estudiantes. Los resultados muestran la necesidad de aunar esfuerzos en la implementación de la educación financiera en Colombia, a través de la articulación de los actores en el desarrollo de un programa educativo integral y el importante papel de la participación de los padres en la implementación de estos programas.

**Palabras clave:** Educación financiera, Educación financiera, Educación secundaria.

**Clasificación JEL:** A21; G40; G53

## 1. Introduction

As the world and technology advance, persons are exposed to financial products from an early age. Digital platforms have facilitated access to financial services, but at the same time, there is a prominent lack of knowledge about how to manage it wisely (Rudeloff, 2019; TAMBUNLERTCHAI, 2018). This has become a notable concern in the main economies of the world and especially in those strongly affected by the financial crisis of 2008, caused mainly by a sequence of bad decisions related to debt. Consequently, the economies of the main developed countries have started to promote programs based on financial education to ensure that consumers became accountable for their finances in the short and long term (Xiao & O'Neill, 2016).

For this reason, the teaching of financial issues has taken on an important role in the educational policies of the countries. Since multilateral and economic organizations are boosting through their studies worldwide the potential benefits of financial literacy in the educational context. (European Commission, 2007; Fernández-Larragueta, Almagro- Lominchar, & Fernández Sierra, 2019). Promoting the idea that if governments provide financial educations to their citizens, it will be a guarantee of long-term growth and stability for the economies, which also implies an improvement in the quality of life of people in general.

It has become crucial for researchers provide financial education to young people to help them to develop their skills in that field. This process is quite important for young people because it will provide them the appropriate tools to making wise decisions about managing financial products and services in their adult life. Besides, it's pivotal to develop these skills at that early age because at that stage, young people are creating and adopting habits and customs that will play an important role in adult life (Batty, Collins, & Odders-White, 2015).

Therefore, in this research, a diagnosis of the level of financial literacy among high school students of Bucaramanga and its metropolitan area was carried out. The analysis sample was built on the Educational Project Institutional (PEI), where it was possible to establish a baseline of their current situation in terms of financial literacy, determining the importance of parents in the implementation of financial education projects. For the development of the previous activities, the objective of the investigation was established, continuing with the state of the art of the study area, followed by the methodology, the results obtained from its development and finally, the conclusions are related.

## 2. Literature review

Financial stability has become an issue of great importance worldwide. Given the economic and political events, it is in the common interest to maintain or improve the quality of life of each of them. This was the lesson learned after the financial crisis of 2008, where a lot of people lost their resources due to poor decisions in the financial field. Since then, it's well- known that the national financial stability depends on the responsible consumption made byall citizens, making a responsible saving of money, and properly planning and managing money during abundance and scarcity times.

Apparently, this fact is clear for advanced economies, which have launched multiple studies of their population to determine and address the shortcomings found. However, in Latin America, not relevant progress has been made about it, and inequality indices continue to increase despite presenting economic growth in recent years (Portafolio, 2019). The OECD, which is the organization that leads the studies on this path, introduced in the PISA tests applied to measure the knowledge and skills in

15-year-old students, a financial education component, in which the results were quite worrisome for our region.

In the 2012 PISA tests, Colombia ranked last (OECD, 2012) in this area, as well as, in mathematics, which is quite close to financial education (Grigsby & Brown, 2016). In 2015, Colombia did not participate in the PISA test, instated, countries like Brazil, Peru and Chile did, occupying the last positions (OECD, 2017). For its part, Peru developed the program "finance at my school". Following the Inter-American Development Bank (Banco Interamericano de Desarrollo, 2019), this program had a positive impact, showing an improvement of 14.8 points in the PISA tests, just as the more active participation of students on the economic situation of their homes. These results were satisfactory according to results showed by other studies (Bruhn et al., 2016; Collins & Odders-White, 2015).

On the other hand, in 2007, Brazil implemented and evaluated the impact of a financial education program in 892 schools. The findings showed an improvement in the subject of savings and budget management among the students belonging to the program (Bruhn et al., 2016). In 2010, Colombia presented a proposal for the implementation of financial education in the country through decree 457 of 2014 arises (Arce Martínez et al., 2016). This first step promoted the creation of the Intersectoral Commission for Economic and Financial Education in 2017 (CIEEF, 2017). Although positive results have been evidenced in the financial inclusion of Colombians citizens, still there is no significant progress related to the implementation of a public policy of financial education in the country (Uribe, 2019).

For the OECD, young people are a good target because they are experiencing a learning process about life in general, which made them easy to address to teach them the basic knowledge required for good financial decision making. Moreover, they are the ones who are close to entering the work market, where without doubt, they will expose to choose among different financial products or services offered by the Financial sector. Not least important, they are the ones who will educate the following generations, leading the country under the needs and requirements of society. These reasons support the idea that being well financially educated will enable young people to make good decisions since the beginning of their adult life. In the long-term, this will guarantee financial stability and an increase in the quality of life of society.

The research agrees that the earlier the age at which a student acquires knowledge in financial matters, the better the performance of their decisions, attitudes, and behaviors of the subject (Bruhn et al., 2016; Xiao & O ' Neill, 2016). Therefore, studies were conducted to measure the impact this would have on children. Teachers in K-12, which is the name used for primary and secondary education in various educational systems around the world, believed that the concepts of financial literacy were very complex for students. However, research studies have shown that even Elementary students have the skills to learn financial terms such as savings, excess, shortage, supply, and demand. The foregoing allows to establish a strong foundation for understanding more complex terms in their future education (Collins & Odders-White, 2015; Jayaraman, Jambunathan, & Adesanya, 2018) and will allow future studies in this population group, as well as teaching and assessment methodologies.

Finally, considering the relevance of the research, it is necessary to carry out this study for the schools of Bucaramanga and its metropolitan area in whose Institutional Educational Project (PEI) contemplates the teaching of economic aspects, highlighting that the schools of this region stand out

as one of the best in the country. Besides, it seeks to generate a diagnosis of the current situation to provide a baseline through internationally validated and proven methodologies, determining shortcomings to propose improvement actions that positively impact the knowledge acquired by students. Such knowledge, properly imparted, eliminates the easy money mentality (Hagedorn, Schug, & Suiter, 2016) that is reliable in society. This will allow training people who are more aware of the management of their economic resources and improving their quality of life. Lastly, this study seeks to raise awareness about the creation of public policies to reduce the gaps found in this study, which eventually will have a long-term impact on the quality of life of Colombians. This study also opens the way to future research in Colombia and Latin America to monitor the results obtained and created new knowledge foundations about the field.

### 2.1. Definition of diagnostic tool

The issue of financial literacy has been quite complex since its inception, the first work of the researchers has been defining financial literacy clearly and concisely, reaching a common agreement with the OECD for a standard definition of it, which refers to:

*The knowledge and understanding of financial concepts and risks, and the skills, motivation, and confidence to apply such knowledge, understanding to make effective decisions across a range of financial contexts for the improvement of the financial well-being of the individual and society, by thus, allowing them to participate in economic life (OECD, 2012, p. 32).*

Later, researchers broke down the components of financial literacy into three pillars: financial knowledge, attitudes, and behaviors (Annamaria & Olivia, 2011; Hung et al., 2009), which are expected to be in a financially literate person. Furthermore, it was determined that without financial knowledge, the other two pillars (attitudes and behaviors) cannot be exploited (Annamaria & Olivia, 2011; Hung et al., 2009). This means that a person with the knowledge will start to analyze their daily experiences from another perspective, which will allow them to change their attitudes and behaviors, thus improving their decision-making in this field (Barua, Koh, & Mitchell, 2018).

Researchers, mainly academics, professionals, regulators, and central bank treasuries, developed in recent years a methodology for measuring the level of financial literacy in young people (Lusardi, 2015), which is based on a survey with questions on financial concepts such as savings, the value of money in time, retirement, among others.

This survey is ideal for assessing the financial literacy of the respondents, thanks to this, researchers showed that in similar educational models, students achieve quite different grades from each other, this is part of their socio-economic differences (Riitsalu & Põder, 2016). Therefore, over time it has been discovered that it also depends on other factors unrelated to educational issues, such as age, family, culture, or place of residence (Agnew, Maras, & Moon, 2018; Belás et al., 2016; Zamora-Lobato, García-Santillán, & Ramos-Hernández, 2018).

Thus, they began to study the factors that positively or negatively affected the level of financial literacy, determining social gaps that significantly impacted respondents, now becoming essential to reduce these gaps (Mancebón, Ximénez-de-Embún, Mediavilla, & Gómez-Sancho, 2019; Moreno-Herrero, Salas-Velasco, & Sánchez-Campillo, 2018). Hence, the effect of knowledge acquired outside

the educational institution is strongly linked to potential effects on the financial literacy of students (Rudeloff, 2019).

For the development of a survey with an OECD focus on young people, three components must be fulfilled (similar to PISA tests): content, processes, and context (Moreno-Herrero et al., 2018). Additionally, the three components of financial literacy must be assessed: financial attitude, financial behavior, and financial knowledge.

- **Content**: it is the essential knowledge about financial literacy. The four areas it contains are the following: money and transactions, planning and managing finances, risk and reward, and finally the financial picture.
- **Processes**: it's related to processing mathematical exercises to make the best decision, it contains the following fields: identifying financial information, analyzing information in a financial context, evaluating financial problems, and applying knowledge and financial understanding.
- **Context**: it is part of the socio-economic analysis of the respondent to analyze their environment and determine factors that can enhance or inhibit their level of financial literacy. The areas it contains are education and work, home and family, individual and social information.

It should be noted that although the questions must be clear and easy to understand, some have complex language in the financial context, to analyze whether the student has the knowledge and the ability to apply it. Moreover, it must be adapted and translated into the culture of the society where it will be applied (Förster et al., 2017).

As a result of joint research, the OECD (2018) published its standards in the article "OECD/ INFE Toolkit for Measuring Financial Literacy And Financial Inclusion" for the construction of a validated instrument following its methodologies that evaluates the three pillars of financial literacy: attitude, behavior and financial knowledge. This is an updated version of the standards already proposed in 2013.

### 2.2 Measuring financial literacy

The measurement of surveys with the OECD approach is based on seven financial context questions, of which students must answer at least four correctly according to the methodology of Kubak et al., (2018) or at least 70% of correct answers (this is a minimum of five correct answers) as recommended by the OECD (2018). Likewise, seven questions of mathematical analysis focused on finances are included in some instruments, in which at least 70% must be answered correctly to affirm that the student surveyed has a solid mathematical basis. The reason why the mathematical component is evaluated is to determine in subsequent analyzes if there is a correlation between the student's financial knowledge and his ability to process numerical information.

## 3. Data analysis

As a consequence, the analysis of the surveys has become more complex because of the incidence of factors and the large amount of information to be analyze, thus, multivariate analysis is necessary using statistical analysis software (Pavkovic, Andelinovic, & Misevic, 2001; Rudeloff, 2019). This approach evaluates the contents that the respondents know and identify socioeconomic gaps, to

establish strategies to reduce them, to improve knowledge and financial decision-making (Kadoya & Khan, 2018; Kubak et al., 2018).

### 3.1. Methodology

Based on the methodologies proposed by A. Hung, A. Parker & J. Yoong (2009) and M. Kubak, A. Tkacova, A. Androniceanu, M. Tvaronavičienė & E. Huculova (2018) to make a diagnosis of the financial education of students, the project is divided into the following parts for the fulfillment of the proposed objectives:

- **The first phase - Characterization of the population to be analyzed**: The characterization defines the potential schools for data collection based on their Institutional Educational Project (PEI), which contains an affinity for teaching on economic, financial, commercial, and accountants' issues.
- **The second phase - Determine the instrument and methodology to be carried out for the evaluation**: In this part, we proceed to identify the methodology for the evaluation of the level of financial literacy according to the characteristics of the study population. This methodology must be validated and verified by several researchers, as well as, the instrument used for data collection, which will be adapted to the Colombian context and the procedure used for its analysis.
- **The third phase - Data collection through surveys**: application of the survey in physical or digital format, depending on the disposition of the schools. The data will be entered into the Google Forms platform for subsequent analysis.
- **The fourth phase - Data processing and analysis**: Hypotheses are proposed, they will be verified through statistical analysis to prove the correlation between variables as recommended by M. Kubak (2018) and Riitsalu (2016) to determine socioeconomic gaps. For instance, "Is there a significant difference between men and women?" Is there a significant difference between public and private schools? " These hypotheses can be validated or rejected with multivariate analysis techniques using statistical software. Moreover, analyzing the behavior and financial attitude of the respondents will allow determining their impact on the level of financial education of the respondent.

The analysis of the surveys will be addressed using the R programming language in the RStudio integrated development environment (IDE). This software is commonly used for data science, statistical analysis, and graph generation, and is among the top ten most used programming languages in the world according to the TIOBE index (2020) that measures the popularity of programming languages.

### 3.2. Evaluation and results of financial literacy

#### 3.2.1. Characterization of schools based on their PEI

According to Law 115 of February 8 (1994), which is the general law of education, article 27 mentions that secondary education or high school corresponds to grades 10° and eleventh 11°, and is divided into secondary academic and technical education as stipulated in article 28. In formal high school, these degrees must include in their curricula the areas of basic education in a greater degree of depth, in addition to the economic, political, and philosophical sciences mentioned in article 31. Besides,

educational entities may organize their hourly workload in such a way that they can delve into a field of knowledge of interest to them, as set out in Article 30 as a specific objective of formal high school.

On the other hand, Article 32 speaks of technical high school in which schools delve into an area of knowledge such as finance, commerce, agriculture, communications, administration, etc. This knowledge is taught with greater emphasis in the tenth 10° and eleventh 11°. Therefore, for the development of this research we worked with 14 high school whose knowledge is focused in the areas of trade, finance, administration, or related for the 10th and 11th grades; and in schools whose curricula include similar contents because they are the educational establishments that have an interest in this knowledge based on their Institutional Educational Project (PEI).

### 3.2.2. Measuring instrument applied

The structure and content of the instrument used were proposed by the OECD (2018) in its document "OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion". However, the language of the document in English and the OECD warns about the translation of the document, especially in the questions used to measure financial knowledge because translation can complicate or change the interpretation of the question.

For this reason, the instrument used is the tool applied by F. Alejandro Villagómez in his research: "Financial Literacy Among High School Students in the Mexico City Metropolitan Area", which meets OECD standards and is in Spanish. Additionally, it has questions with the approach of Lusardi & Mitchell, researchers recognized in the field, these three questions are not exclusive of those of the OECD, they have been included in instruments around the world. This allows comparing the results with those obtained in several countries of the world (Villagómez, 2016). It is also worth mentioning the work that the researcher Villagómez has done as a researcher in Mexico on the topics of financial literacy, savings, retirement, pension, social security, among others.

Once the measuring instrument to be used has been defined, it is adapted to the national context. This means the use of the local currency in the questions of financial knowledge, the use of the evaluation scales used by the educational institutions (Superior, high, basic, and low performance), and the use of the socio-economic level within the questions of the socioeconomic environment of the respondent. Moreover, it is clarified at the beginning of the survey that it is completely anonymous and for research purposes. Also, the use of the socioeconomic level makes it possible to measure the level of income that the respondent's family has instead of asking the explicit question of income, which can cause inconvenience to the directors of educational institutions.

The survey consists of 45 questions, which seek to measure the three pillars of financial literacy mentioned above: behavior, attitude, and financial knowledge (Annamaria & Olivia, 2011; Hung et al., 2009). In addition to questions related to socioeconomic variables, which will allow analyzing the results based on them and finding gaps.

### 3.2.3. Total rating of financial literacy

The rating is obtained from the sum of the score obtained in the three components: Financial knowledge, financial attitude, and financial behavior (OECD/INFE, 2018). The total rating scale ranges from 0 to 21 and determines the level of literacy of the respondent.

### 3.2.4. Sample characteristics

The surveys were developed in the respective classrooms as a test. Table 1 presents the characteristics of the sample analyzed. For this research, a total of 514 surveys were conducted. The surveys were conducted in the classrooms under the supervision of teachers as an examination.

**Table 1. Sample characteristics**

| Gender | Value | Proportion | Age (years old) | Value | Proportion |
|---|---|---|---|---|---|
| Male | 207 | 40,27% | 13 | 3 | 0,58% |
| Female | 307 | 59,73% | 14 | 47 | 9,14% |
| Type of school | Value | Proportion | 15 | 178 | 34,63% |
| Public | 403 | 78,40% | 16 | 187 | 36,38% |
| Private | 111 | 21,60% | 17 | 84 | 16,34% |
| School grade | Value | Proportion | 18 | 15 | 2,92% |
| Grade 10° | 272 | 52,92% | Socio-economic level* | Value | Proportion |
| Grade 11° | 242 | 47,08% | 1 | 51 | 9,92% |
| | | | 2 | 137 | 26,65% |
| | | | 3 | 204 | 39,69% |
| | | | 4 | 91 | 17,70% |
| | | | 5 | 20 | 3,89% |
| | | | 6 | 11 | 2,14% |

***Source:*** Own elaboration.

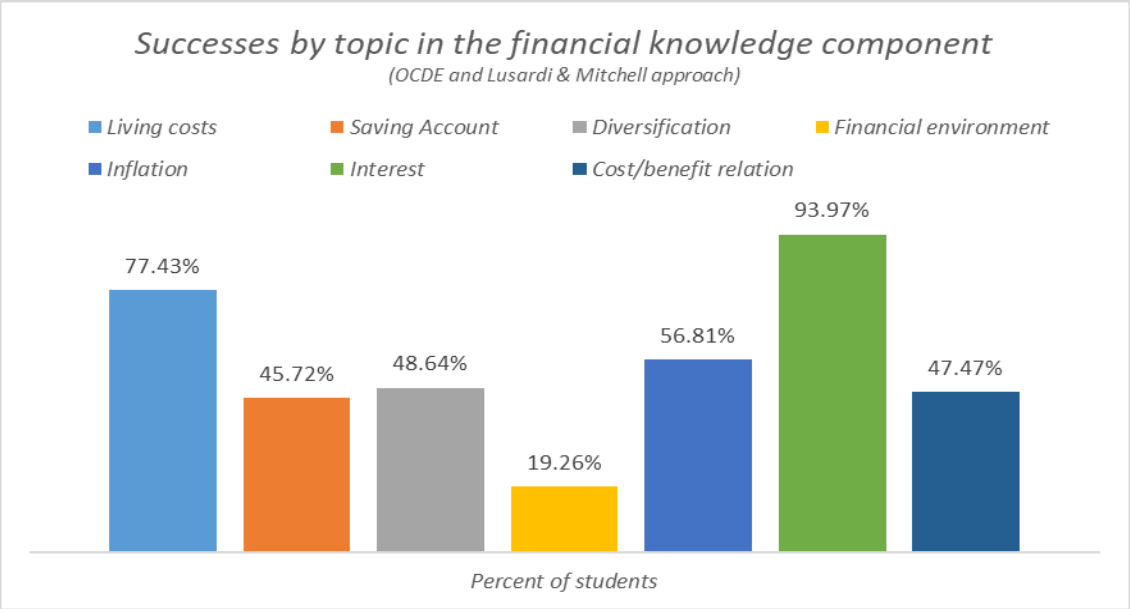
***Note:*** Socio-economic level 1 includes people with a minimum salary income a month. The socio-economic level 6 groups all people with the highest income in the country.

## 4. Results

### 4.1. Rating financial knowledge

The evaluation of financial knowledge consists of seven questions and each question evaluates a different topic. Figure 1 shows the percentage of students who were successful in each topic.

**Figure 1. Successes by topic in the financial knowledge component**

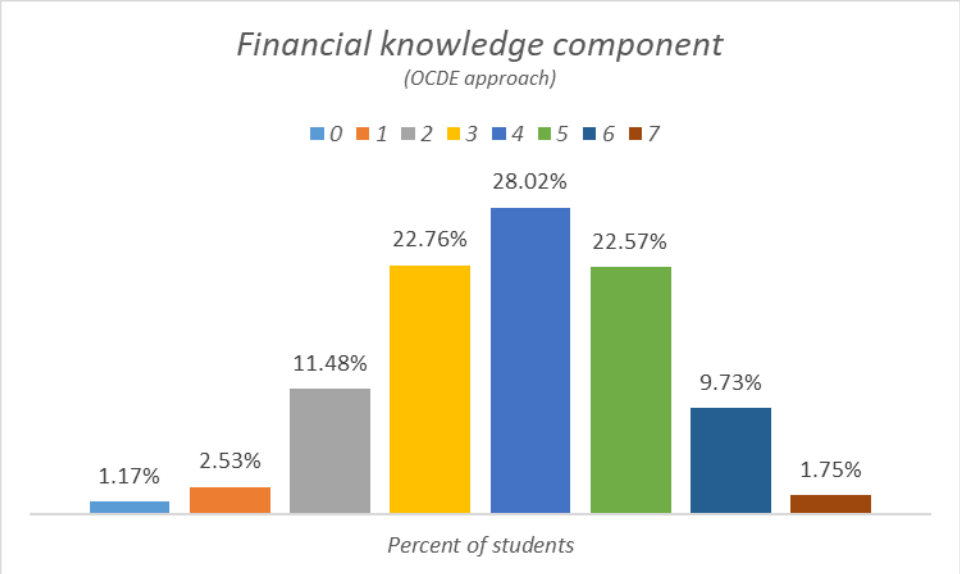



***Source:*** Own elaboration.

As shown in figure 1, only 19.26% of students correctly answered the question of the financial environment. This question evaluates knowledge about compound interest use in financial institutions. On the other hand, in the questions of the Lusardi & Mitchel approach, related to topics of savings account, risk diversification, and inflation, there were successes of 47.72%, 48.64%, and 56.81%. Also, in the question of the cost/benefit relation, we had a success rate of 47.47%. For this reason, it is worth analyzing the responses of the students and observing why these results are due.

Concerning the rating of the component, the results of the evaluation of the financial knowledge component can be seen in Figure 2. Following the OECD/INFE guidelines, where respondents who correctly answer at least 70 percent of the questions pass, resulting in a rating of five or more, 34.05% of students passed the financial knowledge component, which means that 34 out of every 100 students passed. On the other hand, according to the methodology of Kubak, A. Tkacova, A. Androniceanu, M. Tvaronavičienė & E. Huculova (2018) where he passed with a grade greater than or equal to four, passed 62.07% of students.

**Figure 2. Results of the financial knowledge component**



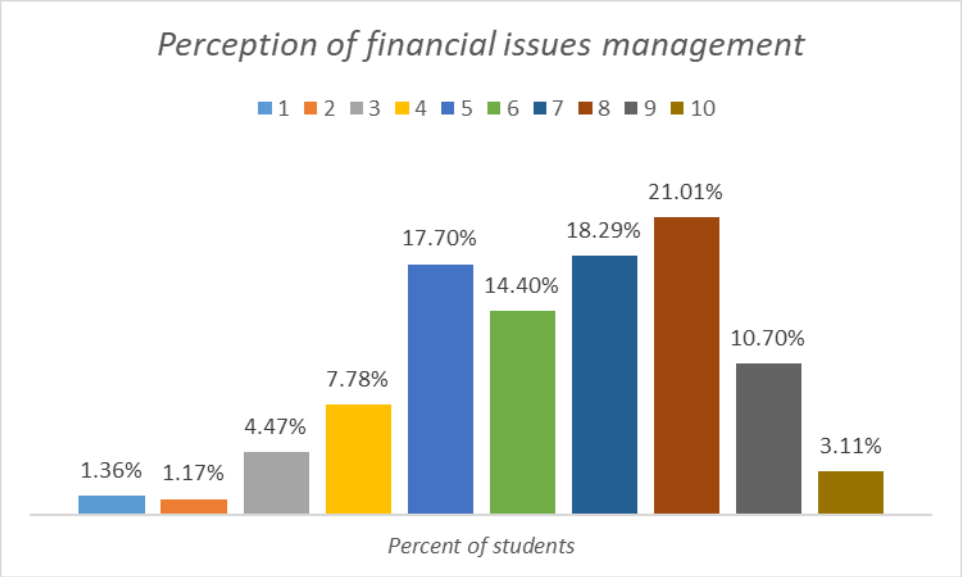

***Source:*** Own elaboration.

However, the proposal of the OECD/INFE (2018) will be taken into account and only those students with a score of five or more will be approved, as it is established in its document "OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion" where the parameters for the construction and evaluation of the instrument are. It should be noted that only 1.75% obtained the maximum score, which is equivalent to 9 students. In summary, of the students of Bucaramanga and the metropolitan area whose educational institutions contemplate a deepening in the areas of commerce, finance, administration, or related, 34.05% have the appropriate financial knowledge, which is the basis for the achievement of financial literacy.

In contrast to the results obtained by Villagómez, where 39.9% of the Mexican students approved the component, a 5.85% higher than those obtained in this research is identified, considering that they are populations with very similar characteristics. Similarly, regarding the results obtained by Carsten Erner, Michael Goedde-Menke & Michael Oberste (2016) for secondary school students in Germany, where they passed 64.2% of the students. It is worth mentioning that for the research of Carsten Erner, Michael Goedde-Menke & Michael Oberste five questions were used instead of seven, the questions were from the Lusardi & Mitchell approach covering basic financial concepts such as interest, compound interest, value over time, among others. To pass, the student had to answer all five questions correctly.

Finally, as mentioned above, at the beginning of the survey was a self-assessment on knowledge and management of personal finance/financial issues. Figure 3 shows the results of students' perception/self-assessment.

**Figure 3. Responses in the perception of financial issues management**




***Source:*** Own elaboration.

It may be noted that the results of the self-assessment are distributed similarly to those of the evaluation. However, this will make it possible to determine whether your self-assessment has a positive or negative impact on the outcome of the component.

**Rating of financial attitude**

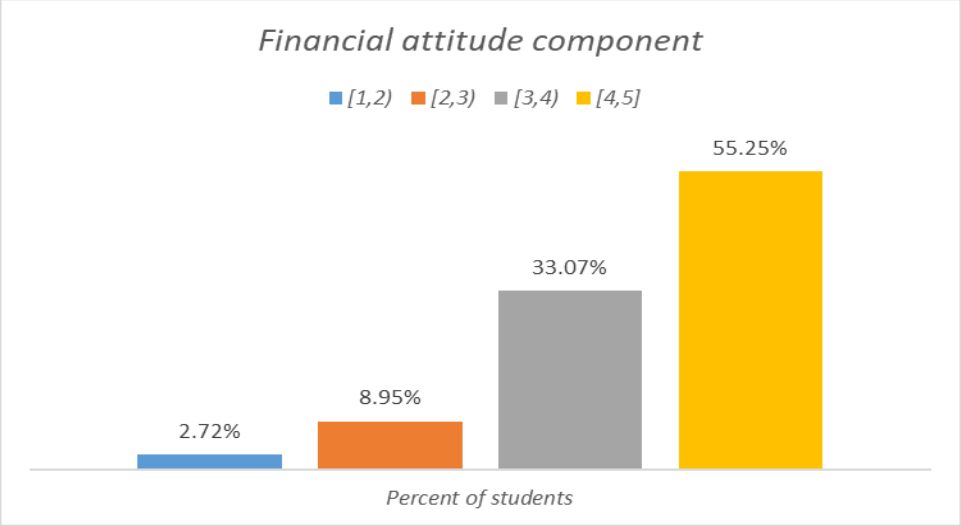
For this component, the respondent must determine if he agrees or disagrees with three statements on a scale of one to five, where one is "strongly agree" and five "strongly disagree", the rating of this component is the average of the three answers given by the student (Figure 4). It is worth remembering that the scale proposed by Villagómez (2016) in this component was inverted to fit the parameters of the OECD, Villagómez handled the one as "strongly disagree" and the five as "strongly agree", this results in a lower rating as the respondent disagrees.

We have that 55.25% of students have a desired financial attitude, 33.07% obtained a score of 3 to 3.99, which is positive but can be improved and just over 10% of students have a low financial attitude.

### 4.2. Rating of financial behavior

For financial behavior, the first part is evaluated with four statements that are equivalent to four points, but contrary to the financial attitude component, this time the respondent is expected to fully agree with the statement. Anyway, it is sought in the same way that the respondent evaluates with the highest possible number each of the statements, only now the five is totally in agreement and the one totally in disagreement, while in the financial attitude component was the opposite. For the grade of the first part of this component is no longer the average of the answers given, now a point is given to the student who agrees with the statements, in other words, that evaluates with 4 or 5.

**Figure 4. Results of the financial attitude component**



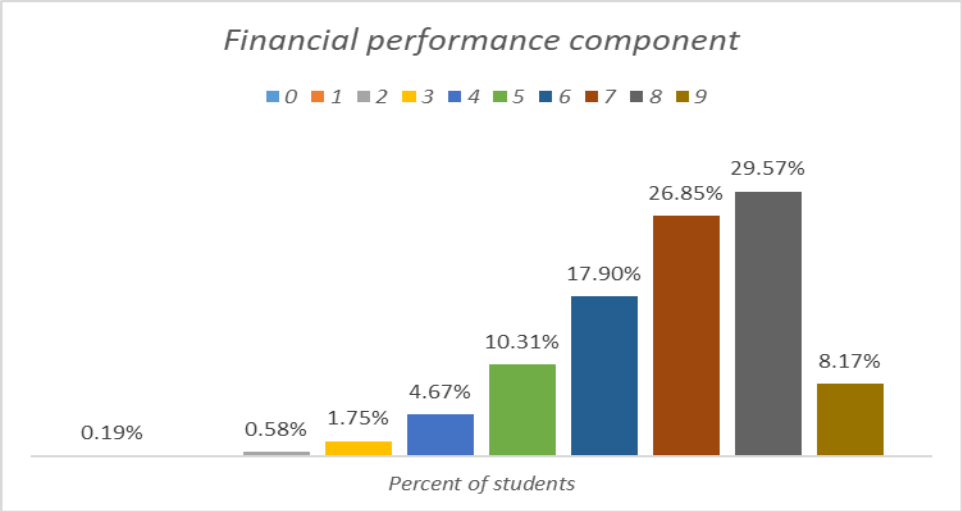

***Source:*** Own elaboration.

The remaining five points are obtained from five questions in which it observes the participation of the respondent in their home if they show saving behavior and good performance in it if they are in contact with financial resources, and what decisions they make when wanting to obtain something and not having the necessary financial resources. The participation of young people and the dialogue with their parents on economic issues has been a factor that affects their financial literacy, although it should be clarified that not all young people learn equally from their parents (Moreno-Herrero et al., 2018).

For the first question, we have that 82.88% of students talk to their parents or visitors about financial issues, which presents a good result for this first question. On the other hand, 90.27% of students receive financial resources from their parents to manage their daily expenses, which allows them to learn how to manage and ration the money. The third question has to do with saving if the student recognizes the value of saving, of which 80.35% of students save or have saved money. Now, the fourth question evaluates the performance of the savings by hypothesizing that the student ceases to receive income, in this question the point is given to the student who can maintain his or her same standard of living for at least one month without receiving income, where the findings show that 32.69% would do it.

Finally, question five seeks to determine what type of decision the respondent makes when they want to buy something and do not have the financial resources to obtain it, for this case ideally save to buy it or not buy it, where 82,68% of students would make or take this decision. In conclusion with the second part of the financial behavior component, there were very good results on the part of the students where results are presented above 80% in four of the five questions asked. The results for this component are presented in Figure 5.

**Figure 5. Results of the financial performance component**




***Source:*** Own elaboration.

### 4.3. Total rating of financial literacy

Table 2 shows a breakdown by socioeconomic variables of the ratings obtained from each component and the total financial literacy obtained in this research. In addition to the total score of the entire sample studied.

Besides, the results obtained by the OECD (2016) in its publication "OECD/INFE International Survey of Adult Financial Literacy Competencies" to measure the financial literacy levels of adults around the world in 2016. The OECD evaluated them using its financial literacy measurement tool that qualifies the three pillars of financial literacy; knowledge, attitude, and behavior. Same instrument used by Villagómez and with which was carried out the information survey for this investigation except for the financial behavior component. Since although it has the same scale and looks for the positive behavior in saving, the fulfillment of financial obligations, financial organization, among others. The decisions that an adult must make differ from those of an adolescent who is about to enter economic life even though they already manage economic resources.

In Table 2, students obtained a score of 3.88 in the financial attitude, this score stands out from that obtained by the countries evaluated by the OECD, because, it is even a higher rating than the country with the highest rating in New Zealand with 3.7. This is a very positive outcome and encourages policies that maintain or improve the financial attitude of young people, also to determine if the financial attitude of people changes as they go into economic life given the increase in income and take action to prevent this from happening.

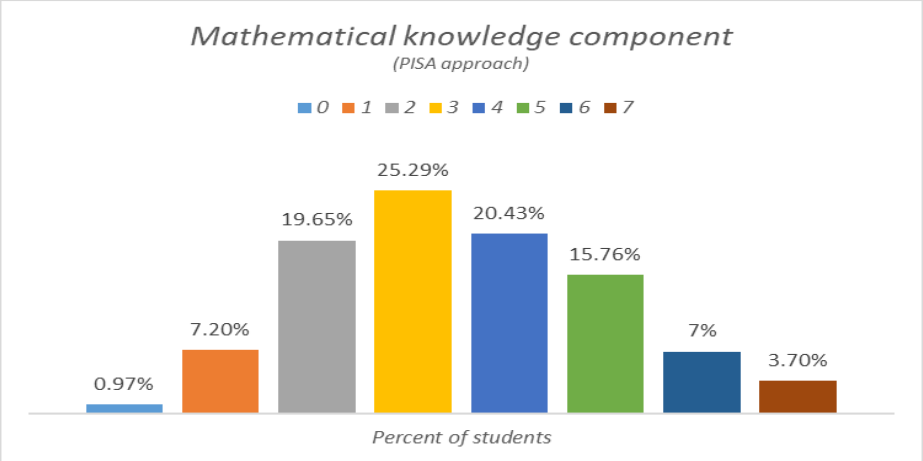
**Table 2. Total rating of financial literacy by socio-demographic variables**

| Rating by component | Mathematics | Financial knowledge | Financial attitude | Financial behavior | Total (Financial literacy) |
|---|---|---|---|---|---|
| Gender | | | | | |
| Male | 3.60 | 3.78 | 3.80 | 6.81 | 14.38 |
| Female | 3.45 | 3.97 | 3.93 | 6.83 | 14.73 |
| Type of school | | | | | |
| Public | 3.36 | 3.77 | 3.89 | 6.86 | 14.52 |
| Private | 4.05 | 4.34 | 3.84 | 6.68 | 14.85 |
| School grade | | | | | |
| Grade 10° | 3.25 | 3.89 | 3.79 | 6.78 | 14.45 |
| Grade 11° | 3.80 | 3.90 | 3.98 | 6.87 | 14.75 |
| Age (years old) | | | | | |
| 13 | 4.33 | 5.00 | 3.57 | 7.00 | 15.57 |
| 14 | 3.28 | 4.06 | 3.83 | 6.68 | 14.58 |
| 15 | 3.54 | 3.83 | 3.92 | 6.87 | 14.62 |
| 16 | 3.53 | 3.96 | 3.83 | 6.80 | 14.58 |
| 17 | 3.58 | 3.87 | 3.93 | 6.90 | 14.70 |
| 18 | 2.87 | 3.27 | 3.85 | 6.47 | 13.58 |
| Socio-economic level | | | | | |
| 1 | 3.29 | 3.84 | 3.94 | 6.61 | 14.39 |
| 2 | 3.31 | 3.94 | 3.88 | 6.84 | 14.67 |
| 3 | 3.50 | 3.68 | 3.87 | 6.80 | 14.35 |
| 4 | 3.86 | 4.25 | 4.00 | 7.08 | 15.33 |
| 5 | 3.55 | 3.90 | 3.52 | 6.25 | 13.66 |
| 6 | 4.09 | 4.55 | 3.34 | 6.91 | 14.79 |

### 4.4. Rating of mathematical knowledge

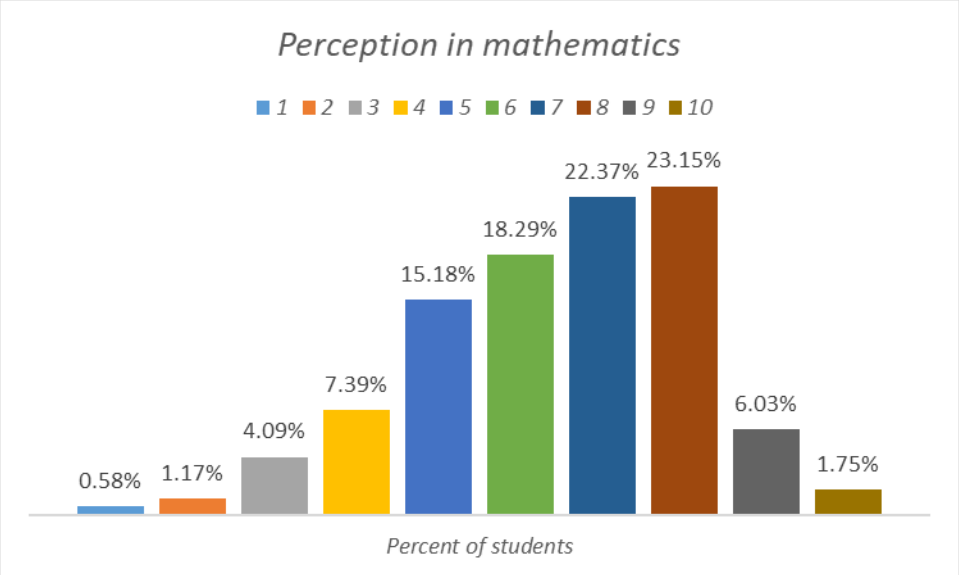
The results obtained from the evaluation of the mathematical knowledge component are shown in Figure 6. The numerical ability of the student is evaluated by questions that contain the same criteria as those used in the PISA tests.

**Figure 6. Results of the mathematical knowledge component**




***Source:*** Own elaboration.

**Figure 7. Results of perception in mathematics**




***Source:*** Own elaboration.

The same grading method is followed for the financial knowledge component where those with a rating of five or more pass. Thus, figure 6 shows that 26.46% of students passed the component, with 7.59% less than those who passed the financial knowledge component. The evaluation of this component allows to determine if there is a correlation between the performance in mathematics and the financial knowledge of the respondent.

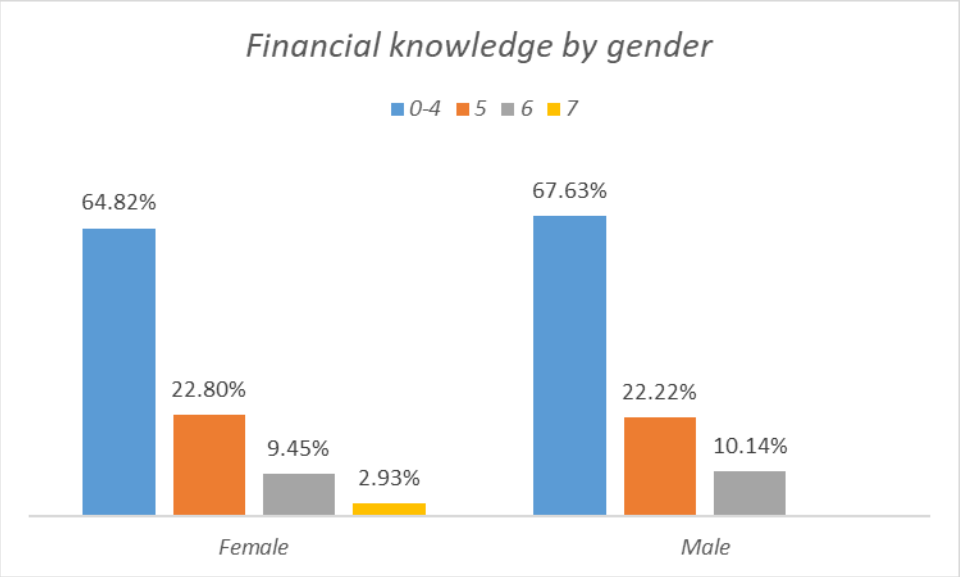
On the other hand, as with the financial knowledge component, Figure 7 shows the self- evaluation of students in mathematics, in order to determine whether the perception of students in the subject has a positive or negative impact on their results.

### 4.5. Results by socio-economic variables

For socioeconomic variables, the financial knowledge component will be analyzed, due to all respondents receive the same education, and the educational institutions surveyed delve into related topics. The obtained grades in this component will be analyzed taking into account socio-economic variables. Financial knowledge is the basis for acquiring an adequate level of financial literacy (Saeedi & Hamedi, 2018).

Figure 8 shows the performance in the financial knowledge component by gender, in the interval 0 to 4 of axis X of the figures were grouped the students who obtained a score of zero to four in the financial knowledge component, that is, students who did not pass this component will be grouped for all the figures. It is recalled that the total of the sample is 514 surveys and that it is approved with a rating equal to or greater than five in the component of mathematical and financial knowledge, making this grouping summarizes in a better way ratings.

**Figure 8. Results financial knowledge by gender**



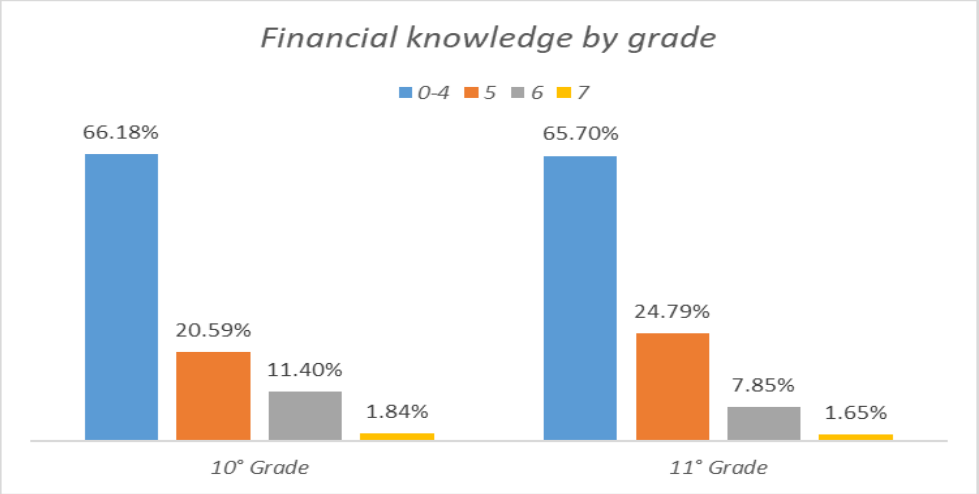

***Source:*** Own elaboration.

Figure 8 highlights that only 9 students correctly responded to the entire financial knowledge component obtaining the highest qualification and that they are all female, which is equivalent to 2.93% of women and 1.75% of the total sample. On the other hand, observing the other ratings, distributions have to behave similarly. For example, students who failed to pass and fall within the 0-4 grade range are 64.82% of women and 67.63% of men, 22.8% of women and 22.22% of men scored five, 9.45% of women and 10.14% of men got a score of six, and 2.93% of women got the maximum score while none of the men got this score. It should be noted that there is a higher percentage of

women than men in the sample, but still, the difference is not significant since men are 40.27% of the sample.

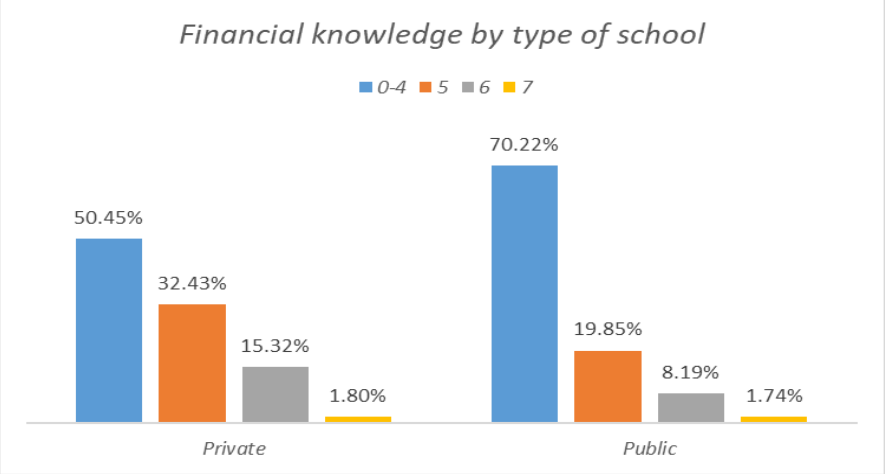
Other factors to be examined are the performance by school grade, in Figure 9 we have the performance according to the school grade for grades 10° and eleventh 11°.

**Figure 9. Results financial knowledge by grade**




***Source:*** Own elaboration.

**Figure 10. Results financial knowledge by type of school**



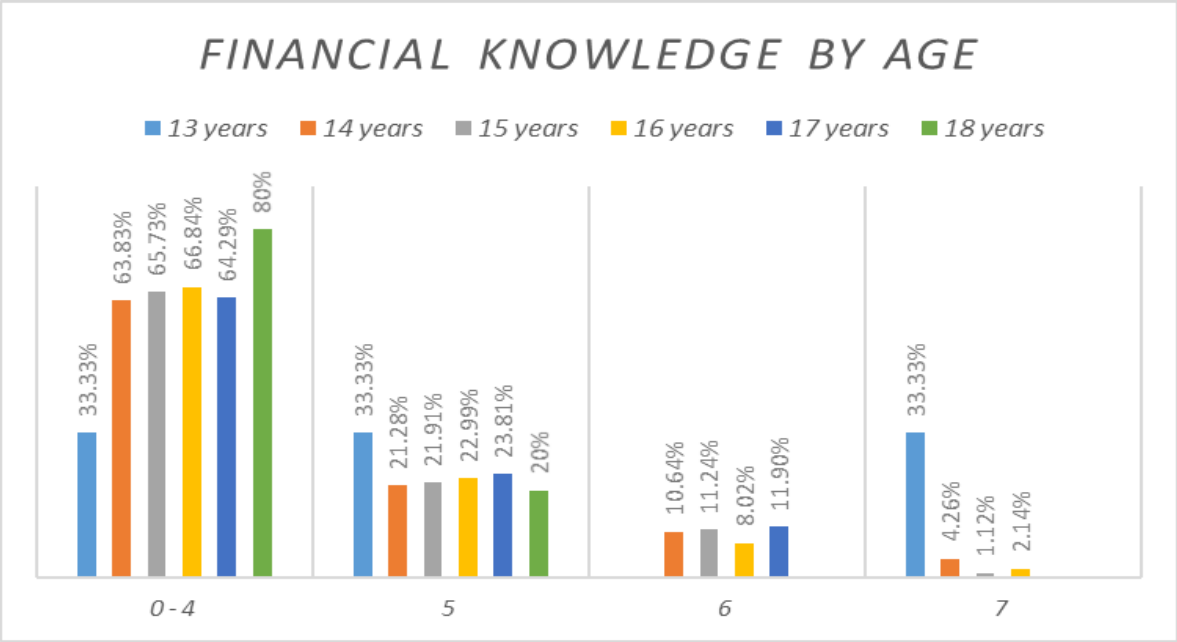

***Source:*** Own elaboration.

There is a similar pattern in the distribution of grades for the 10° and 11° grades, as shown in Figure 8 where performance by gender was observed. These results are interesting because those of the 11° grade have one more year of schooling than those of the 10° grade, it is also worth remembering that the 10° and 11° grade represent 52.92% and 47.08% of the total sample.

Figure 10 shows the performance in the financial knowledge component, this time by the type of school. It should be noted that public schools represent 78.40% of the total sample and private schools 21.60%.

In this case, a significant difference is observed in the grades that are in the range with a score of 0 to 4, where for the case of private institutions, 50.45% of their students are within a score of 0 to 4, while in public institutions it is 70.22% for this interval, and the rating of five in 32.43% and 19.85% respectively. Age is also a factor to be analyzed, Figure 11 shows the performance in the financial knowledge component by age. For the ages, the respondents of 13 and 18 years represent 0.58% and 2.92% of the total sample respectively, equivalent to 3 and 15 students.

**Figure 11. Results financial knowledge by age**

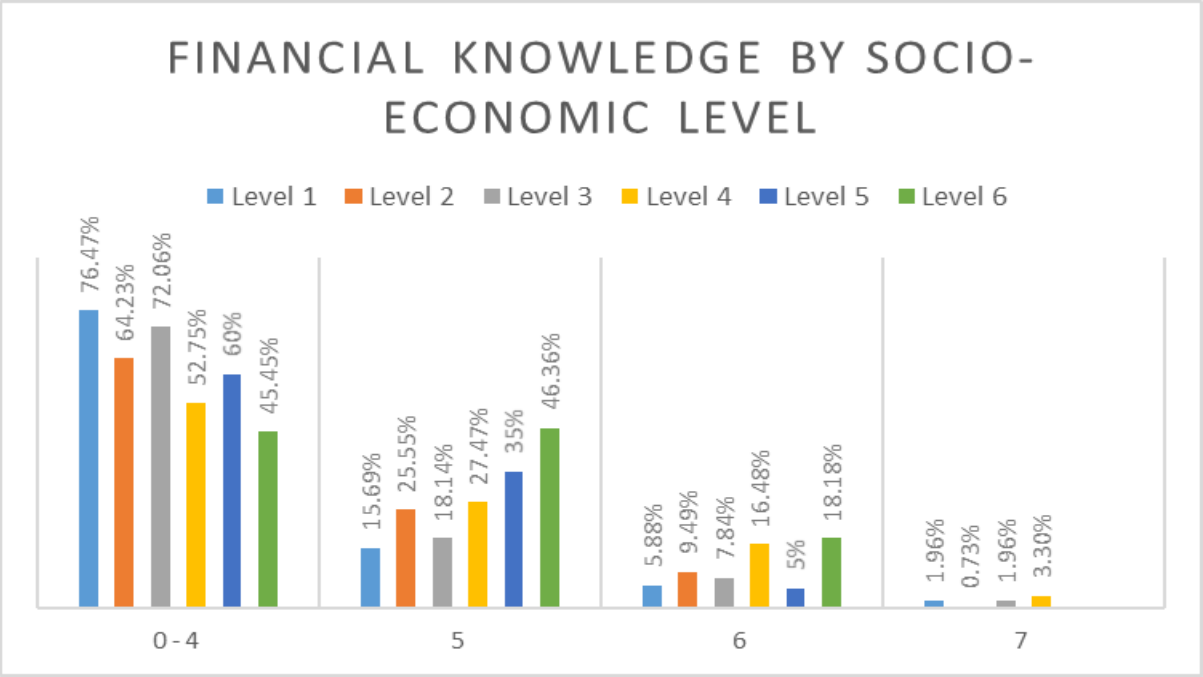



***Source:*** Own elaboration.

This small number of respondents between the ages of 13 and 18 reflect a fairly different distribution of qualifications than the other ages, highlighting that the respondents of 13 years obtained the highest average rating with 5.0 in the component of financial knowledge as was observed in Table 9. On the part of the other ages, there is no significant difference between the results of the same.

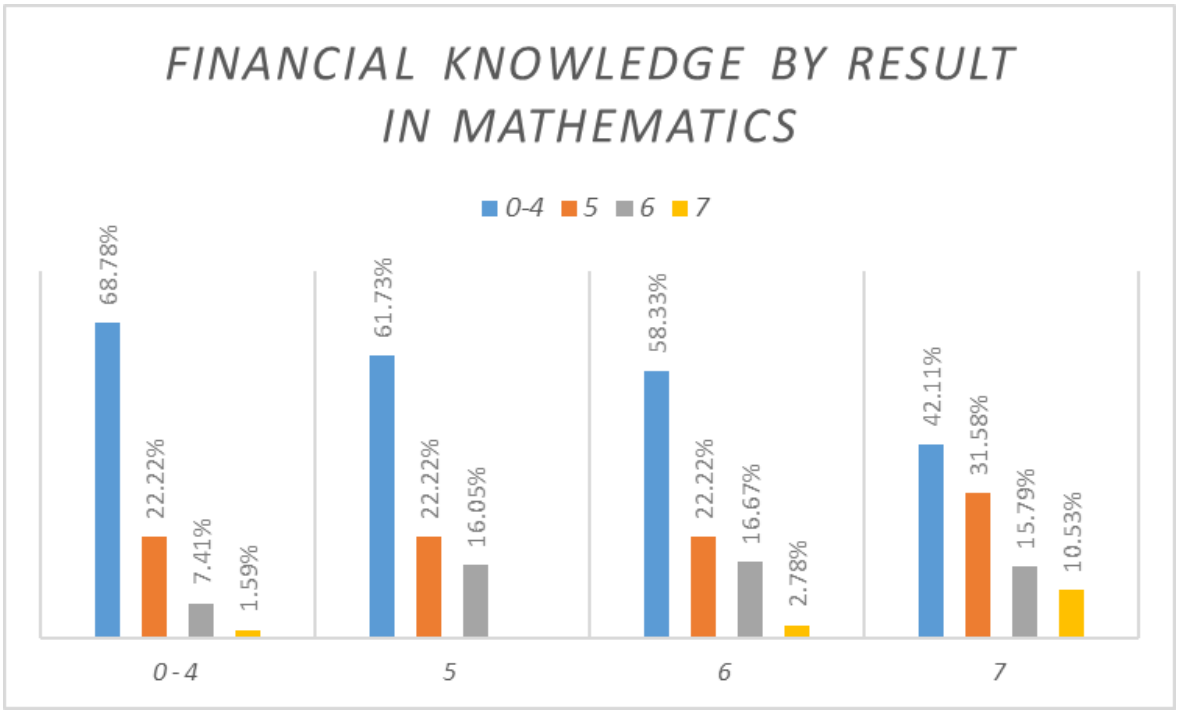
For the results by socio-economic level, Figure 12 shows the performance of each socio- economic level in the component. Levels 5 and 6 represent the smallest proportion of the sample with 3.89% and 2.14%, which equals 20 and 11 students respectively.

**Figure 12. Results financial knowledge by socio-economic level**




***Source:*** Own elaboration.

**Figure 13. Results financial knowledge by result in mathematics**




***Source:*** Own elaboration.

It is observed that socio-economic levels 4 and 6 obtained the best results by having the lowest number of students in the grade from 0 to 4. In contrast, the percentage of students with the grade from 0 to 4 for levels 1 and 3, being 76.47% and 72.06% respectively.

Although this is not a socio-economic variable, it is worth analyzing. As mentioned in the survey structure, there is also a mathematical knowledge assessment component, which is used to determine whether mathematical knowledge has an impact on the processing of financial information. Figure 13 shows the performance in the financial component according to the score obtained in mathematics, the yellow color represents the students who scored from 0 to 4 in mathematics, so on up to the dark green color, where students with the highest math score with a grade of 7 are.

Finally, the performance improvement is evident as the student achieves a better grade in the mathematics component. For example, students who obtained a score of 0 to 4 in mathematics (yellow color), 68.78% of them did not pass the financial knowledge component, while students who obtained the highest score in mathematics (dark green color), 42.11% of them did not approve the component, which is a noticeable difference.

## 5. Conclusions

Having a teaching focus on financial issues is not enough in the implementation of a financial education program. Should be set as a goal for the training of graduates who have the profile of a financially literate person to achieve the desired results. Likewise, the implementation of new policies that evaluate the performance of financial education in the country and its real effect on people's knowledge and financial behavior is necessary.

Since the indicators are focused on the number of people reached, the number of workshops, and the banking of the population instead of assessing the acquired knowledge and financial behavior of the people involved. The measurement of impact can be through tools such as the one presented in this research work in spaces such as state exams where a financial education test is available and not with few questions within the mathematics test. This will allow for better monitoring of financial education at the national level, as well as greater commitment on the part of educational institutions in this area.

This situation is an opportunity for improvement for all financial institutions to continue with the development and support of financial education practices for their customers, especially those who are starting their economic life. Practices like accompanying and advising clients at the time of borrowing decisions and bearing in mind that the economic well-being of its clients will boost national economic stability. Furthermore, the use of different methodologies to measure the impact of their educational programs, since the material used for teaching is quite traditional as are the primers, brochures, books, talks and seminars (CIEEF, 2017) and should be guided more towards the needs of each person.

The education and information provided by financial institutions should be impartial, transparent, helping clients to understand the benefits and risks of different types of financial services. This information must be provided in clear and simple language as stipulated in Law 1328 of 2009 in Section 3 of Chapter One. Information should be provided in interactive formats, taking advantage of the opportune moments to provide such information, and promoting the use of new technologies that are sustainable and scalable (Uribe, 2019).

For future research on the field, one of the axes of research should be the development of financial education programs that allow having an experience towards decisions and situations that resemble those of the real world (Jayaraman et al., 2018). Gamification plays an important role in the implementation of financial education strategies, it accelerates the learning process of individuals. Also, the continuous measurement of the impact of these programs on the improvement of students' financial education should be established.

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