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Efficiency of interactive financial education model: Evidence from high school and university students

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Abstract: *The objective of this study is to bring new model of financial literacy education for youngsters at high school and college/university, through the use of active pedagogical and didactic methodologies. This study designs new model which serves as a preparation strategy for the PISA test (Program for International Student Assessment) as an alternative to improve financial lives. The method applied was investigation-action in four steps: a) construction of the model, b) implementation, c) testing, and d) improvements in order to develop pedagogical and didactic strategies that improve financial literacy. The model was applied in Colombia to 200 high school students, and 150 university students. It was found that the proposed interactive action learning model stimulates learning through competitiveness and yields positive results at financial knowledge for making appropriate financial decisions for both high school and university students. The results show the use of active pedagogies, through role play, contests, and decision making, generates better knowledge appropriation tools, making the learning model more effective in financial education. The results show significant improvement in the knowledge level of both high school and university students.*

Keywords: *pedagogical practices; financial literacy; financial education; PISA; game-based learning; action-learning.*

1. Introduction

The economic situation in many countries and current crises that impact many areas, such as social, economic and financial due to the COVID and recession requires enhanced quality of financial education for development of youngsters and thus economies and to support vulnerable population to be able to understand their financial decisions that strengthen their ability to develop life plan (López-Rodríguez and López-Ordoñez, 2022). Authors Gnan et al. (2007) stated that financial education contributes to the general budget of economics. By virtue of this, Avendaño et al. (2021) adds that financial education is a key process for the development of financial competences. Their study confirmed the essential role of financial

perceptions and capacities developed in a university on student sample. The results show that knowledge of topics such as interests, management costs lead to desirable improvement.

In terms of financial behavior, 64% of people in Colombia plan their spending for less than a month or, worse, do not have any plan to calculate the money they will spend, according to data from the World Bank (2017). Consequently, financial education plays a decisive role in the growth and economic development of countries and regions. As Sekita, Kakkar and Ogaki (2022) states, financial literacy has an economically large and positive impact on wealth accumulation. It allows citizens to achieve the knowledge that leads to efficiency in the use of the system's own resources, which, in turn, tend to improve the quality of life of people through successful financing decisions. People with a high level of financial literacy access credits with a greater knowledge, and the selection of better saving and investment alternatives. According to Oberrauch and Kaiser (2022) people with higher cognitive ability and financial literacy are more likely to make patient inter-temporal choices. Cognitive ability and financial literacy play an important role in respondents' allocation behaviours within the experiment and financial literacy is uncorrelated to errors in decision-making at the individual-level. Sekita, Kakkar and Ogaki (2022) decompose financial literacy into 5 sub-categories and find that deposits literacy, risk literacy and debt literacy have significant impacts on wealth accumulation. Authors found that variables suggested by behavioural economics, such as over-confidence, self-control, myopia and risk-aversion are also significant determinants of wealth. Financial education, then, contributes not only to energize the economy, but also to develop skills for informed decision-making, to evaluate risks, and to identify financial opportunities, which generate more prudence against credit services.

Given these problems, the Colombian State has increased its interest in implementing programs that contribute to the financial education of its population. Different entities, have developed pedagogical strategies to strengthen some components of personal finance and the appropriation of basic concepts in the area (Ministerio de Hacienda y Crédito Público, 2011). Law 1328 of 2009, for example, forces financial institutions to develop financial education campaigns for their clients, since the institutions of the same country have seen the need to include the topic of financial economic education (EEF in Spanish) as one of the components of training for young population. However, the aforementioned initiatives show little evidence of the effectiveness of the programs; Banco de la República (2011), argues that there is no unanimity about the impact of EEF (Economic and Financial Education) programs.

1.1. Financial education in Colombia

The normative framework for the EEF in Colombia is composed of the General Education Law (Congreso de la Republica de Colombia, 1994) and Article 2 of the Political Constitution of Colombia, which refer to facilitating the participation of all citizens in the decisions that affect them and in the economic, political, administrative, and cultural life of the Nation; and Decree 457 of 2014 by which an Intersectoral Commission for the EEF in Colombia is created.

Según Cano et al., (2015) in the laws 1450 of 2011 and 1328 of 2009 support the first advances in Financial Education in Colombia; the 1450 law determines that the Ministry of Education should implement in school curriculum of development of basic competences in economic and financial education. In the law 1328, banks were required to develop financial education programs and campaigns.

The National Ministry of Education MEN (2014) defines EEF as a pedagogical project that integrates knowledge, skills, abilities, attitudes, and values, enhancing the capacities of children and young people to solve everyday problems that are directly related to their social, cultural, scientific, technological, and economic environment.

Also, other education institutions, including the Department of Economic and Financial Education (EEF), were participating on the principles of advancement and training in financial education. New training opportunities should improve the quality of education which includes projects for teaching and teaching materials.

Gnan et al. (2007) find that definitions of EEF around the world have three elements in common: they aim to generate greater understanding and capacity for decision making; they favor the recognition of the interrelation of people with the financial system; and they incorporate characteristics and conditions of the social context in which people are empowered to make financial decisions. To comply with this regulation and in order to improve the effectiveness of the EEF, the Central Bank (2012), recommended making experimental designs, using students of economy as operators and making use of active pedagogies.

These pedagogies, according to Mendoza (2002) are based on four elements: spontaneity, by which all regulated learning becomes an obstacle; the functional element, such as intellectual and moral development by means of the stimulation of the individual's interests; the social element, which makes the class life and not the preparation for life; and the person, as an individualized construction of the culture.

1.2. Strategy for financial education

Countries such as United Kingdom, Australia, Japan and United States, have developed Financial Education Strategies based on the importance of the topic for economic stability (Andujar, 2019). In Latin America, the strategies are more frequent. The first to develop a National Strategy was Brazil in 2010; Uruguay and Ecuador in 2012; Honduras and Paraguay in 2015; Chile, Colombia, Mexico and Peru in 2017 and Argentina and Guatemala in 2019 (OECD/CAF, 2020). The OECD (2022) in its report on the evaluation of national financial education strategies, concludes that evaluation strategies in the strategy should be mixed, contemplating quantitative and visual elements. OECD also propose a participatory approach to the development of financial education programs.

In the case of Colombia, the Intersectoral Commission for Economic and Financial Education (CIEEF) set the first National Strategy for Financial Education in 2017; its objective is to promote economic and financial education (EEF) for impact on accountable and informed decisions (CIEEF, 2017). This Strategy work with four local groups: 1- The group of formal education includes all associate professors and students. 2- The vulnerable population group includes people in the coastal situation and the fighting conflict. 3- The "active stage" group is adults between 18 and 55 years old and finally 4- the group of small companies. Additionally, as a cross-sectional segment, the retention group for the retreat and the protection for the ride are included. As part of the Bank of the Republic (2020), the main topics of current initiatives in financial education are: credit usage, investments, financial product use and risk management.

Described financial strategies, policies and focus groups were taken into account and methodology was created using modern intercative methods while implemented on two groups of students and youngsters. This research shows the financial education model that was developed from the review of different strategies that have been used by some financial institutions, as well as from the need that was identified in the results of the PISA (Program for International Student Assessment) tests. In the case of high school students, this model of Financial Education was validated in the municipality of Rionegro, Colombia, with ninth graders, and it showed a positive effect on the appropriation of knowledge in its results evaluation. In the case of higher education students, the model was validated with postgraduate students from a recognized university in Bogotá, Colombia.

Attention to financial education as a fundamental element for consumers to make prudent decisions about personal finances has been highlighted after the financial crisis of 2008 (Eades et al. 2013). Lusardi and Michell (2011) reported that, worldwide, women have a lower level of financial education than men; young and old people have a lower level than those in their middle age; and more educated people have more financial knowledge.

Floyd (2015) compared two university groups in order to measure the level of financial literacy, and it concluded that the years of education in a university are positively associated with financial education. On the other hand, Bernheim and Garrett (2001) studied the effects of financial education on personal savings. They concluded that people who have participated in financial education programs in their jobs, have a greater incentive to save for general purposes and for their retirement plan.

Dewi et al. (2020) conclude that the level of financial education also defines the level of rationality in the volume of financial decisions. Accordingly, Morris et al. (2022) demonstrate the influence of the capacity to learn in the financial sector, and also suggest that financial education should be improved to increase existing financial differences. The statistical results of Mutlu and Özer (2022) revealed that financial education would have a positive effect on financial cooperation. Also, Morgan and Trinh (2020) with their investigation in Laos, demonstrate that people with higher education and better financial knowledge will have more probabilities to make correct decisions.

Given the importance of the topic, the development of a financial education strategy is pertinent and appropriate. The proposed model is based on the theory of Meaningful Learning, stated by Ausubel (1983), since it basically seeks – through active learning pedagogies such as games, workshops, competitions, and simulations – to make the student connect financial education with knowledge that has been already learned, such as mathematics and their own family experiences.

The Discovery Learning proposed by Bruner in 1960, and quoted by Camargo et al. (2010) is also present in the financial education model since the classes are designed in such a way that problematic and ambiguous situations are presented; which can lead to more than one solution and also to let the students put forward what they would do. Based on the results obtained, we proceeded to draw conclusions with the main findings, and to explain how these findings partially or totally support the theoretical concepts intended to be developed.

The two previous theoretical positions used in the financial education model and presented here, are framed within the Vygotsky's Theory of Constructivism, according to which prior knowledge is what gives rise to new knowledge (Payer, 2005). The author continues: "That is in every constructivist activity there must be a circumstance that makes the previous knowledge structure falter and forces a rearrangement of the old knowledge to assimilate the new."

Consequently, we sought students to explore about the acquired knowledge about basic financial topics through a diagnostic test. Then, we proceeded with the active methodologies in which they create their own financial plans using the new financial concepts studied in class. According to Arceo et al., (2001) the optimal learning environment is that where the dynamic interaction between teachers, students, and the activities allow learners to create their own truth. So, the context is essential to understand what happens, and to build knowledge based on the understanding of that reality. By letting the students solve problems, play, and interpret situations of daily life related to financial planning. They are able to recognize how it affects their lives; how budgeting and finance decision-making goes beyond a set of instructions that a teacher dictates to become a skill, because they have been architects of their own learning.

The case method, however, offers the possibility of being much more effective due to its interactive, iterative, and dynamic format (Eades et al., 2013). In the model that has been proposed, the presentation of a critical case formulated as learning based on experiences, has represented a successful strategy to awaken students' interest in appropriating knowledge, and understanding the necessary tools to avoid falling into the same error as the individual under study in the critical case.

Financial education programs have proliferated in recent years as banks are required to set a yearly budget to create EEF (Economic and Financial Education) programs. Their strategy has been the implementation of MOOC (Massive Online Open Courses). However, when the population is evaluated, statistics show that they grasp only a few concepts. Authors such as Osuna-Acedo et al. (2018) performed a review of the state of the scientific literature on the concept of MOOC, which has had a strong evolution as a training proposal based on the construction of participatory learning. Among the main results, the authors present the taxonomic definition of successful characteristics for learning, among others: Authentic tasks, which are given by the application to situations of real life; transfer of learning by competency building; collaborative work, and tolerance, as the pedagogical design have to be adaptable to diverse participants.

Another relevant study on the teaching of financial literacy concluded that the curriculum should relate to the circumstances of students' lives, and should use pedagogical techniques, such as small groups, stories, or exercises, that involve multiple dimensions of the students. Students need to practice and apply concepts to their own lives (Taylor et al., 2012).

According to Ramírez-Montoya and García-Peñalvo (2018) in the open pedagogy processes, the triangle between shared science, co-construction, and open innovation must be the fundamental basis. From this, the adoption of new forms of knowledge construction becomes evident, as well as the new actors, new interrelations of disciplines, new possibilities to open the knowledge that has been generated, and new tools to transfer that knowledge.

The foregoing translates into the creation of spaces for innovation, the resolution of problems and the creative approach of possibilities for civil society. Thus, the financial education project, besides increasing financial knowledge for the participants, contributes to create culture, solve social problems, and improve of the quality of life of those involved.

According to Camilli-Trujillo and Römer-Pieretti (2017), vulnerability translates into concrete human groups that, although they know what is happening around them because of their own social and cultural condition, they are marginalized. These authors carried out an analysis of literacy compared to the empowerment of vulnerable groups regarding Information and Communication Technologies (ICT), which can be overlapped with financial education.

It is important to complement the financial education strategy with training that reaches the family of the involved students in the study. A study carried out by Floyd (2015) proved that there is a positive relationship between the status of the parents and the financial education of children. The authors Novo et al. (2017) recognized that the construction of a connective brain begins at the earliest ages of human development, that it is we develop our mathematical thought, through which key elements to make decisions, solve problems of daily life, treat data, and understand the environment emerge.

The objective of this study is to establish and test new model of financial literacy education for young people (high school and college/university), through the use of active pedagogical and didactic methodologies. This article focuses on students who could be categorized as a vulnerable group, given their youth, and their low economic stability that give them unfavorable conditions and lack of experiences with personal financial plans and actions.

1.3. PISA tests

The Organization for Economic Cooperation and Development (OECD), launched a program to analyze the performance of students in their basic training, and those who are in the threshold of starting work, from the development of standardized tests that provide statistics for the adoption of public policies that improve the quality of education (OECD, 2007). According to Ramos (2013), the Program for International Student Assessment (PISA) aims at making an international assessment of the competencies of these students, among the countries participating in the program.

The test that was applied as part of this project was designed to assess the skills and abilities of students in the analysis and resolution of problems, and to face situations that will arise in adult life through the areas of reading, mathematics, and sciences. The evaluation model deals with a comparative model that is characterized by being a sample (students of 15 years) and cyclical (every three years) (Gallardo-Gil, et al. 2010); and that based on the results offers a profile of the abilities of the participants, as well as information on their personal, familiar, and school context (OECD, 2007).

The PISA tests are not designed to verify specific contents of school programs, but rather to recognize skills that may come from everyday life, from family, social, cultural, and school circumstances (OECD, 2007). In this sense, the proposed financial education model is not only relevant for the mathematical competence subject evaluated in the tests, but also for the adoption of active pedagogical methodologies, which promote the learning of students from situational activities and modeling of real-life cases.

Regarding the mathematical competence that is evaluated in the tests, it is defined within the PISA context as the individual capacity to identify and understand the role played by mathematics in the world (OECD, 2017), understanding these as a set of processes that provide answers to problems. Thus, according to Rico (2007), human beings face mathematical situations in everyday life in different ways, such as: shopping, travel, food, taxes, organization of times, personal finances, among others.

2. Materials and Methods

The population of case study consists of total 350 students from Colombia; 200 ninth graders (high school students) from educational institutions in the municipality of Retiro - Antioquia, in age group 14 to 16 years old, and 150 university students from a university in Bogotá in age

group 21 to 29 years old. Students both from public and private institutions were included. The data collection was anonymous and respondents did not their gender or age. Thus, the exact numbers of males/females or age division are not presented as the research was not collecting such information and only focused on financial literacy of respondents.

The research method used in this study was the investigation-action: The research has an interactive scope with a mixed approach, as follows:

a) Design of documentary analysis, current financial education models review. The categories were analyzed as a modality of the financial education strategy. We considered tools and instruments used, target audience, developed topics, pedagogies used, and skills developed. In addition, the structure of the PISA tests in financial topics was reviewed in order to incorporate the aforementioned contents in the education model.
b) Non-experimental design with a descriptive analysis made from the application of a pre-intervention test (diagnosis of financial knowledge). We used financial literacy questions on the test. In the case of high school students, the diagnosis focused on ten topics: income and expenses, personal budget, investment, interest rates, financial institutions, savings, financial products, pensions, stock market and financial instruments. In the case of university students, the diagnosis focused on a three-question test designed by Lusardi and Mitchell (2011) and contained the Financial Burden and Financial Education Survey instrument of the National Administrative Department of Statistics (DANE). In total, 350 students were evaluated using the tests. We identified flaws in students´ knowledge in terms of financial literacy basics; they filled a post-intervention test with the purpose of measuring the degree of knowledge in the field after the intervention.
c) Design of interactive methods of financial education model (see Table 1 for details).
d) Use of the model in practice for validation.
e) Test of students´ results obtained by pre and post-test.

The analysis techniques that were used are quantitative descriptive techniques and a matrix of hermeneutical comparative analysis. Table 1 summarizes the methodological phases of the project.

Table 1. Methodological design of interactive financial education model

Development of an EEF (Economic and Financial Education) strategy aimed at high school and university students			
Design of methodological tools Traditional education-active learning pedagogies		Needs identified through a pilot test	EEF Strategy Impact Assessment
Booklet	Topics Definition Modules Construction Booklet Graphic design Intervention schedule design	Field intervention Personal finance for teachers Contests Media deployment	Instrument design Initial diagnosis Implementation Final diagnosis Implementation
Lectures	Strengthening student operators Preparation of teachers' personal finances		
Workshops	Active learning pedagogies workshops design Traditional education workshops design		
Contest	My First Million "Who wants to be a Millionaire?"		

Firstly, we obtained the design of the methodological tools that combine elements of traditional education with active learning pedagogies in a series of adaptable tools depending on the type of youngsters.

2.1. Design of interactive teaching methods focusing on high school students

Financial education was subject of analysis and taught using the following methods: Booklet, face-to-face thematic lectures, conventional and non-conventional workshops, and a contest in which participants were encouraged to actively demonstrate their knowledge. The methods used are described below:

a) Financial Education Foundations Booklet: a guide consisting of six modules: interest and indebtedness rates, financial institutions, financial products, savings culture, personal finance, and investment in the stock market. The topics of the booklet were selected based on the Financial Education module of the PISA tests, taken from the Instituto Nacional de Evaluación Educativa de España (2014).

b) Lectures: one of the conventional strategies used is the face-to-face training in classrooms of high school students, and lectures entitled Personal Finance for Teachers, in order to bring them closer to the topic of Financial Education and multiply the impact of the project.

c) Workshops on active learning pedagogies: they were carried out in the interventions, through active learning and didactic methodologies, and learn-by-doing workshops on the contents. The three workshops were carried out as follows:

i. Active Participation Workshop # 1 - Barter: students exchange products, with the purpose of strengthening the concept of barter, and solving the problems or difficulties of negotiations.

ii. A.P. Workshop # 2 - Role-play: The moderator assigns the functions following a script in which several situations are described; as the characters are narrated, students must make decisions about what to do with the difficulties that arise as the story unfolds.

iii. A. P. Workshop #3 – Financial budget: each student is given a sheet of paper in which first, they must creatively make their own personal financial budget or determine their financial goals.

iv. A. P. Workshop # 4 – Selection of funding sources: each participant must choose the best source of financing according to the situations arising from the applied exercise that appears in the booklet.

d) "My First Million" Contest: a contest among the participating groups with the purpose of testing, in a didactic and playful way, the knowledge that has been acquired during the development of the project. Some of the games that were chosen are One Minute to Win, Ladder, and Kahoot.

2.2. Design of interactive teaching methods focusing on university students

a) Conference-workshop and initial diagnosis test - The importance of the financial education: the conference seeks to sensitize the student, and initiate the process of awareness of the importance of understanding concepts such as savings, budget, their pension plans, their current credits, and the importance of making adequate decisions on indebtedness and investment. Here, the financial education test is given to the participants to identify their level of knowledge in topics that are related to interest rates, inflation, and savings.

b) Analysis of critical cases (experience-based learning): a critical case is presented to alert and prevent the student from reaching the limits of over-indebtedness, citing an example: Business Administration Student, 21 years old, with a debt exceeding 30 million pesos

(approximately USD 8.5001), based mainly on consumer products and no assets, who works in a bank and who is about to be reported at credit bureaus. Subsequently, the student's bank statements are reviewed, seeking for them to understand the logic of the purchases with credit card, the implications of the interest rate, and the benefits of the portfolio purchase through their own history.

c) Workshop-simulation of stock market: using a game of roles, we established teams to play the roles of businessmen, whose main goal is to act as intermediaries in the market with oil bonds and dollars, being all the groups in a direct competition. The aim of the simulation is for the student to understand the effect of the environment, and thus, make sound investment decisions.

d) Family budget simulation workshop: two volunteers are chosen to participate as family members and economic decision makers. The other people may participate as consultants, in order to advise the family. The family must survive 30 days with a salary, making different decisions such as the choice of a place to live, their transportation expenses, the choice of a health plan, public services, and expenses of the children. Role-playing allows people to develop awareness of their expenses. The main objective of the activity is to reach the end of the month with a positive balance.

e) Savings ladder: the game is based on a ladder where the students can move forward as long as they answer questions that are related to the financial system, savings concepts, and pension and retirement plans.

f) "Who wants to be a Millionaire?" Final contest: three teams must be established. Each team is benefited with two aids, 50/50, and the help of the group. Each member must answer a multiple-choice question, or true-false question. The questions are relationated on topics of savings, investment, indebtedness, and pension and retirement decisions.

To validate the model, we developed a diagnostic instrument based on ten questions for high school students and three question-test for university students; the topics were described in the previous section.

As a result of the application of this pre-intervention and post-intervention diagnostic test, an evolution in the knowledge of the beneficiaries of the project was observed, based on a classification of the level of knowledge of the students (high - Grade ≥ 4-, medium -3 ≤ Grade <4-, and low - Grade <3-) performed at the beginning and at the end of the intervention; it can

[1] TRM 1 USD = 3.500 COP

be seen how the percentage of students with a high level of knowledge increased in all the institutions at the end of the process.

3. Results

The case study and developed model presented in this paper was tested to compare initial results with results after use of the suggested EET model.

The changes to the previous system were the following:

1) High school students
   a) Financial Education Foundations Booklet: modules and topics were upgraded based on current topics and approaches to financial planning
   b) Lectures: teachers were subject of financial education on personal finance to be able to help students
   c) Workshops actively involving students
   d) "My First Million" Contest: modern mobile technologies were used to make all students interact and get actively involved (Kahoot etc.)
2) University students
   a) Conference-workshop and Initial Diagnosis Test: focus on student´s own situation
   b) Analysis of critical cases (experience-based learning): showing real problems and impact of wrong financial decisions
   c) Workshop-simulation of stock market: attracting students to investments
   d) Family budget simulation workshop: creating real family budgets
   e) Savings ladder: knowledge contest among students
   f) "Who wants to be a Millionaire?": use of principles of popular TV game

To compare the results and evaluate the impact of new method, firstly, students' initial knowledge was tested. As described in methodology, the low knowledge represents grade <3, medium grade 3 to 4-, and high grade ≥ 4. The grades were given based on the test scores.

In the initial administration of the financial literacy test, the results of high school students (ninth grade) were the following: medium level (50.5%), low level (28.6%); and only a small portion of the students (20.9%) presented a high level. However, after the intervention, the results were inverted, since students with a high level represented the highest percentage (59.9%), while those of the medium and low levels represented 29.75% and low 10.4%, respectively.

In the case of the diagnosis of university students, 10% were in a high level, 32% in the medium level, and 58% in the low level. After the intervention the number of students in the high level increased to 62%, medium level 26%, and 12% in the low level. Summary of results and Chi-square test of differences are resented in Table 2.

Table 2. Financial literacy pre and post test

	No of students	Initial level of knowledge			Post-test level of knowledge			Chi-square
		low	medium	high	Low	medium	high	p-value
High school students	250	28.6	50.5	20.9	10.4	29.7	59.9	>0.001
University students	150	58.0	32.0	10.0	12.0	26.0	62.0	>0.001

These results reaffirm the progress, as in addition to having achieved an evolution, the greater number of intervened students culminated with a high level in the appropriation of financial and economic issues, which, although basic, are fundamental in the national development.

Analyzing the progress of the high school (ninth grade) students in the low and medium test levels for each of the topics developed, it was evidenced that, in the two tests applied, the Income and Expenditure module obtained the highest degree of knowledge. This module is followed by Investment, which showed that the modules that have greater daily applicability give better results. On the side of Financial Institutions, it can be concluded that, although it was the lowest rated in the final test, it was the module that represented the highest growth, going from a percentage of effectiveness from 35% to 65% (see table 2). Further, university students post-test evidenced a greater level of understanding in the questions on inflation and interest rate, in comparison to the question about risk diversification. This reiterates the greater ease of understanding in everyday issues, as it was seen in high school students.

4. Discussion

Worldwide, average financial literacy is low, which implies not only a misuse of financial products, but also a low willingness of the less literate population to accept financial advice. As Berková and Holečková (2022) stated, it is necessary to innovate teaching methods with the emphasis on the effective competency development and readiness for the future. Anderson (2017) reported a positive and significant correlation between the level of financial literacy, and the level of saving of people and retirement planning.

Different authors have calculated and analyzed the results of a financial education test that has been administered in different countries such as the Lusardi and Mitchell (2014) in USA, Sekita

(2011) in Japan, Arrondel et al., (2013) in France, Fornero and Monticone (2011) in Italy, Klapper and Panos (2011) in Russia, and Brown and Graf (2013) in Switzerland. In general terms, 50% of the population or more does poorly in the test. According to Lusardi and Mitchell (2014), only 30% of the population managed to answer the questions correctly in the US. In contrast to this study, for the diagnosis, the highest percentage of the population of basic and higher education institutions are classified in the medium and lower levels of financial knowledge.

Our results are consistent with the study by Amagir et al. (2022) who develops a financial education program for students. Emphasis has to be paid to quality of teachers. As Oyenuga et al. (2019) point out, academic staff has to be further educated and upgrade their knowledge to reach the need for up-to date knowledge and offer intellectual benefits to students.

The results confirm that the level of financial knowledge of students has been achieved; meeting their active involvement and objection intentions. On the other hand, in the long run, the results are not taken into account, in order for the authors to suggest a method for developing the effectiveness of their program by recording students´ outputs. In the same line, authors such as Rodríguez and Saavedra (2019) conducted an experiment with a group of youngsters to open a banking account in Colombia and a periodic text message campaign containing financial training had been sent on their mobile phones to improve their financial decisions. The study records an amount of the current account balances and shows a reduction of retirement charges. Also, Harcourt-Cooke, Els and van Rensburg (2022) add that use of modern approaches in financial education (including comics) lead to better understanding of students. Modern methods help with perception and applicability of their financial deisions in real life. Therefore, policymakers and schools should support modern financial literacy education.

On the other hand, study by Pérez et al. (2018) on financial education focusing on university students confirmed that the study sample recognizes the importance of personal finance, but they lack knowledge regarding savings and credit. This predominates in the majority of the sample. The students were in fraud of predatory debt.

Study conducted by Rodriguez-Raga and Martinez-Camelo (2022) evaluates the impact of financial education in a sample of schools in Colombia. One of its results is that better financial knowledge and test results are achieved by students of public schools in comparison to privates. This points at the need to create and apply established programs and tailor it to different types of students and schools.

According to Zingales (2015), financial education is fundamental to promote good finances, minimize financial risks, and avoid bad financial practices. Calderón (2018) proposed that the

financial education in Colombia could be the solution to an exclusion; in its study, the implementation of this education in educational institutions will provide students with a project on a sample of good use of money. That is to say, academics hold in research and teaching, a tool of social transformation and social perception regarding the importance of the good use of finance.

Martínez and Rivera-Acevedo (2018) studied the impact of informal indebtedness on the population of vendors in Cali, the third largest city in Colombia in terms of population. The authors identify that, despite the fact that the sellers receive a good income, they cannot improve their living conditions due to the high cost of debt and exclusion from the formal financial system. Consequently, their profits are affected by the high costs of debt. Harcourt-Cooke, Els and van Rensburg (2022) adds that complex financial products are generally poorly understood which neatively impacts financial decisions.

Vučetić et al. (2022) adds that financial literacy positively address anxiety, lack of control, nervousness, and fear of death. Authors state that financially educated people also have better long-term disaster risk management.

Along the same lines, Brown (2016) found how young Americans, who have deficiencies in financial literacy, show high dependence on debt and incorrect payment behavior. This implies that higher levels of financial education bring lowers the level of indebtedness and therefore, better behavior in terms of personal finances. Lo Prete (2022) also documents that across different countries more informed personal finance decisions are associated with financial literacy and use of digital financial products in practice.

Consequently, programs to bring financial education to young people and children have been developed in different countries, similar to the model of financial education for young people that is being implemented in this article. One example is the case of the UK, where the Personal Finance Education Group (PFEG) implements a financial education system for children throughout the country, funded by the government. The program has achieved that from childhood, people have guidelines for financial behavior. despite the fact that it is a complex and challenging task as it is difficult to reconcile the interests of parents and school with those of the financial system which seeks to sell more financial products ignoring over indebtedness (Zokaityte, 2017).

Limitation of implementation of this study is that the method is designed for groups of no maximum 30 students. Thus, the implementation in larger groups would require a greater effort in logistics to replicate the model.

5. Conclusions

In Colombia, financial education is being implemented in high school education and is, in turn, one of the greatest needs due to the volatility of the economies, for which society should be prepared as a basis for the creation of a financial culture.

The proposed model uses activities aimed at the youth population during regular education at institutions, such as a role-play, an experiential learning activity called barter, talks, contest, budget workshops, selection of funding sources, using new technologies that are attractive for youngsters. For the case of the university population, it includes activities such as a stock market simulation, a family budget simulation game, the analysis of critical cases of indebtedness, and contests with a similar format to "Who wants to be a millionaire?". Moreover, additional education of teachers is crucial as otherwise teachers are not able to further expand the knowledge of students.

A relevant finding of the study is the validation of the proposed financial education model as the results show significant differences ($p<0.001$) and the level of tested students reached significant improvements towards high level of financial knowledge. In case of high school students, the level of high knowledge raised form 20.9% (pre-test) to 59.9% (post-test) and university students from 10.0% (pre-test) to 62.0% (post-test).

From this study we concluded that an active pedagogy approach, with didactic teaching strategies, draws students' attention and represents a greater motivation source to acquire financial knowledge. Additionally, the need to compete through the formulated contests represents a stimulus for the apprentices; a positive response was evidenced both in the contest "My first million" and in the contest "Who wants to be a millionaire?" The proposed model shows greater effectiveness, compared to traditional methodologies.

Likewise, in addition to the relevance of the proposed pedagogical model for finance teaching, it seems necessary to spread this innovative style of financial education around education institutions.

Therefore, the inclusion of financial topics in the curriculum of education institutions is pivotal to improve the decision-making processes in our society. These decisions will promote the financial culture, improve the living conditions of the population and strengthen the financial market and the economic growth of the country.

As a general result, a significant improvement in the financial knowledge of the groups was obtained by comparing the pre and past test results. The scores expressed in the results section (Table 2) show the effectiveness of the tools used. The use of the proposed approach motivated

students to learn financial concepts as they found them useful in real life situations. This progress in the financial literacy levels of students pose a significant leap in the economic prospects of the country.

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