Does formal and business education expand the levels of financial education?

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Abstract

Purpose – Financial education has become an essential component of the economic balance for families, and much is being discussed about the methods, which raise the levels of financial education of the population. Thus, the overall objective of this study was to evaluate the effect of formal and business education on the level of financial education.

Design/methodology/approach – This research is characterized as a quasi-experimental study, with undergraduate students. As a data collection technique, a structured questionnaire was used.

Findings – The results confirm the importance of formal and business education, as well as gender, for the financial education of individuals. More specifically, being male and having contact with a greater number of financial disciplines increase the level of financial education of the individual.

Originality/value – This article demonstrated that the trajectory of the knowledge traversed by individuals within the same level of schooling is of paramount importance. The results show that formal and business education can improve the levels of financial education and reinforce the relevance of strategic actions in this area.

Keywords Formal education, Business education, Financial education, Financial literacy

Paper type Research paper

1. Introduction

While it is possible to see an expansion of financial services around the world, the lack of sufficient financial education for individuals to make the most of these services is also evident. According to the Organization for Economic Co-operation and Development (OECD, 2013), financial education or financial knowledge is a method in which people perfect their understanding of concepts and risks of financial products. However, Mitchell and Lusardi (2015) observed that levels of financial education are low even in developed countries, with financial illiteracy becoming acute for some demographic groups, such as women and the less educated. In this sense, studies show that socioeconomic variables have an influence on the levels of financial education, such as income (Xue *et al.*, 2018), gender (Kadoya and Khan, 2017; Potrich *et al.*, 2016) and formal education (Lusardi and Mitchell, 2011; Messy and Monticone, 2016).

Within this context, much is discussed about the methods to raise the level of financial education of the population. Scheresberg (2013) noted how there are vast differences in financial education between those with a university degree or a postgraduate degree (higher levels) and those whose education is limited to an average level (lower levels). Besides, the number of subjects related to the financial area also has a strong link with the level of financial education (Amadeu, 2009).

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In view of the aforementioned scenario, the general objective of this study is to evaluate the effect of formal and business education on the level of financial education. In addition, we sought to verify the level of financial education of students and then examine whether there is a difference in financial education according to gender, family income and the stage in which the student is in the undergraduate business course.

Furthermore, we understand that schooling is an important factor in this search, but little is known about the trajectory of this knowledge within the same level of schooling. Thus, we contribute to the literature as we thoroughly investigate one method, which is mostly used to obtain higher levels of financial education: formal education. More specifically, this study analyzes the contribution of formal business education, that is, the increase in the level of financial education when taking a business course. Concepts such as the time value of money, the relationship between risk and return, effects of inflation and mainly basic math are essential lessons for those who take the business route but not just for that, since it assists the individual in the domain of contents such as the compound interest rate and accumulated balances, which can assist, for example, in the correct use of the credit card and in the contracting of financing. In this sense, business courses focus on preparing students for business life in order to enable these students to be able to analyze and plan the implementation and control of strategies. For this reason, it is extremely important that these courses are analyzed. After graduating, these students will need to manage a company and their own lives and the management of financial resources is part of any and all management.

Besides that, most of the literature points to a direct relationship between formal education and financial education using as a proxy for formal education the completed educational levels (elementary, middle, undergraduate and graduate), without considering the financial content to which individuals were exposed throughout this formal education. This research innovates this issue while evaluating the same level of formal education (university business students), the advance in the level of financial education obtained due to the offer of disciplines that address the basic and advanced subjects of financial education. Thus, it seeks to verify if the advance within an undergraduate course allows the expansion of the level of financial education.

Although many studies on financial education already target college students, most do not assess the financial content offered to them or the stage at which the student is in the course, which may compromise results. Thus, it becomes evident of the importance to explore the path traveled by individuals within the same level of schooling. On the other hand, due to the possession of the results of this research, it will be possible to call into question an appropriate curricular development to achieve continuity, and whether or not there is a need to implement elective courses in the context of individual programs will be raised.

Finally, the fact that this research is carried out in a developing country deserves attention. Cole *et al.* (2011) wonder why there is a limited demand for financial services in emerging markets. The authors then come up with two possible answers. On the one hand, low-income individuals may not want formal services when informal markets function reasonably well. On the other hand, limited financial literacy can be the barrier, given that if people are not familiar or comfortable with the products, they will not demand them. Therefore, investigating an emerging market like Brazil is another motivation for this study.

2. Theoretical background

Due to increasing financial globalization and imposing financialization of the world, where the markets become increasingly complex and sophisticated, it is essential for companies and families having a good knowledge of finance (OECD, 2017). In the search for a definition of financial education in literature, inconsistency and lack of consensus are observed. Terms such as "financial literacy" and "financial education" are customarily used as synonyms (Kadoya and Khan, 2019; Scheresberg, 2013).

However, authors such as Potrich *et al.* (2016) defend the conceptual separation of these terms. For these authors, the definition that appropriately encompasses this idea is that of the OECD (2017), which defines that financial education or financial knowledge is a method in which people perfect their understanding of concepts and risks of financial products, thus being able to develop the skills and confidence necessary in making fundamental and safe decisions. In this way, it encompasses the knowledge of issues related to the definition of risk and returns, inflation, simple interest and compound, among others.

Due to this importance, in the literature, several studies seek to evaluate the level of financial education, including a variety of nomenclatures that seek to measure the same type of knowledge proposed by this work: financial education. Ambuehl *et al.* (2014) are an example of that. They sought to understand questions regarding financial decision-making, using a scale with five questions entitled financial competence.

Additionally, there are those who also use the term financial education, such as Clark *et al.* (2015). When investigating the relationship between financial education and expected returns, they used five variables, the first three of which were developed by Lusardi and Mitchell (2008, 2011) and the others by Clark *et al.* (2014).

Besides, the OECD (2013) also developed a questionnaire containing eight questions to understand the theme. The questions aim to understand interest calculations, the relationship between inflation and return, inflation and prices, risk and return, as well as the role of diversification in reducing risk. Also, Lusardi *et al.* (2017) developed the P-Fin Index (Personal Finance Index). This index measures the knowledge and understanding that enable conscious financial decision-making and effective management of personal finances through 28 questions about common financial situations that individuals encounter and in this sense it can be seen as an indicator of "knowledge practical." In this context and using the largest international survey of young people (15-year-old students) is the Program for International Student Assessment (PISA) of OECD, for example, Swiecka *et al.* (2020) found in Poland a good and partially very good level of financial knowledge of the young people, 45.3% obtained an average level score and 43.8% achieved a high-level score in financial knowledge, showing that they can be rational in their financial decision-making.

In pioneering research carried out in Brazil, Potrich *et al.* (2016) proposed the Financial Literacy Thermometer, an indicator to facilitate the identification of the profile of individuals as having low or high level of financial literacy, presenting 13 questions to measure the dimension of financial literacy. Following the definition of the dimensions of the financial literacy of the (OECD, 2013), the Financial Literacy Thermometer was elaborated from three constructs: financial knowledge, financial attitude and financial behavior.

Also, the Brazilian Central Bank, to assess the level of education and financial inclusion of the population, adapted to the Brazilian reality a Toolkit Infe/OECD survey. The instrument uses questions that seek to capture aspects of knowledge, attitude, behavior and use of financial services (Central Bank of Brazil, 2017).

When investigating factors that could contribute to the level of financial education of individuals, studies have shown that formal education of individuals is highly correlated with financial education, as Messy and Monticone (2016) state. The authors argue that low levels of schooling are closely linked to low levels of financial education. In Japan, Kadoya and Khan (2019) surveyed 3,905 individuals and found that the level of financial education differed significantly depending on the level of education, so more educated respondents had high scores on financial education.

In a similar survey, Lusardi and Mitchell (2014) have announced there are substantial differences in financial education for education by drawing attention to those who have failed to obtain a college education. The authors comment on how these individuals are less likely to master the basic concepts of financial education. Scheresberg (2013) also found there are vast differences in financial education between those with a university degree or a postgraduate

(higher levels), and those whose education is limited to a medium level (lower levels), the latter showing lower rates.

In this same sense, in a study carried out in Brazil with 587 university students, Amadeu (2009) indicates that the number of subjects related to the financial area strongly connects with the level of financial education, increasing positively. In Brazil, Potrich (2016) identified a strong correlation between schooling and financial education, finding an increase in the levels of financial education as the level of schooling increased.

After that, trying to understand the differences between socioeconomic variables in the approach to financial education, several studies in different countries and samples have been proving the relationship of these variables with the financial literacy levels of individuals. One of the most influential socioeconomic variables within this context is the discussion about differences in financial education according to the gender of the individual. Several authors have found that women show lower rates of financial education than men (Kadoya and Khan, 2017; Potrich *et al.*, 2015; Xue *et al.*, 2018). Kadoya and Khan (2017), for example, reported that women in Japan have less financial education, whether single or married. While women scored almost equal to men for the basic issues of financial education, they scored significantly lower for the complex issues related to risk and diversification.

In the Brazilian context, Potrich *et al.* (2018) confirmed expectations of previous research to find a significant relationship between financial literacy and gender. In addition, the most vulnerable group, in this case, female subjects, was a significant association between financial education and marital status, education, personal income and family income variables.

Studies also show that individuals with higher levels of income tend to have higher levels of financial education (Potrich and Vieira, 2018; Xue *et al.*, 2018). Agarwalla *et al.* (2015) commented on one explanation for this phenomenon would be because individuals with a higher income are encouraged to seek better investment opportunities and consequently have more access to good sources of knowledge.

The Central Bank of Brazil observed a similar effect. Generally, it was identified that Brazilians are not in the habit of saving, especially those that make up the lowest income brackets, thus demonstrating low resilience to unforeseen events and how much Brazil needs to advance regarding the quality of citizens' financial citizenship (Central Bank of Brazil, 2017).

3. Method

This research is characterized as a quasi-experimental study since it does not meet two basic assumptions of the experiments: random sample selection and complete control of all situations (Campbell and Stanley, 1963). The target population comprises undergraduate students in Business Administration from the Federal University of Santa Catarina. The choice of the target public is due to the main objective of the study, which is to evaluate the effect of formal education on the level of financial education of individuals subject to financial discipline, according to the Business Administration course.

Table 1.
Summary of the instrument

Dimension	Measures	Questions	Authors
Respondent profile	Gender, semester, income	1, 2 e 3	Prepared by the authors
Financial education	Financial literacy thermometer	4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18 and 19	Potrich *et al.* (2016)
	Financial citizenship series	4, 5, 14, 15, 16, 17, 18, 20, 21 and 22	Central Bank of Brazil (2017)
	Personal finance index (*P*-Fin index)	23, 24, 25, 26 and 27	Lusardi *et al.* (2017)

As a data collection technique, a structured questionnaire was used. The instrument is described in Table 1.

The variable manipulated in the quasi-experiment is the student's phase in the course, which represents the level of knowledge to which it was exposed. Thus, it is considered the phase in which the student is within the course (1-beginning, 2-middle and 3-end) as the research manipulations, so the initial phase comprises of students in semesters 1, 2, 3 and 4. The intermediate phase includes students from semesters 5 and 6, at which time the subjects of Financial Administration I and II are taught. Finally, the last phase comprises individuals attending semesters 7, 8 and 9 of the undergraduate courses (Table 2).

Phase	Subjects	Acquired financial knowledge	Instrument questions
1-Initial phase (semester 1 to 4)	Precalculation	Sets and basic arithmetic. Calculation with algebraic expressions; equations; inequalities; functions	4, 5, 12, 13, 14, 16 and 22
	Statistics for administrators I	Exploratory data analysis. Two-dimensional analysis. Regression and Correlation. Time series. Indexes numbers	
	Statistics for administrators II	Notions of Probability. Binominal and normal distributions. Sampling. Estimation of parameters. Hypothesis tests for proportion, mean and difference of means	
	Financial math	Interest and Discounts: Simple and Compound. Rates. Lace. Amortization of debts	
2-Intermediate phase (semester 5 and 6)	Financial management I	Financial Administration and Globalization. The postulates of the Financial Administration. The financial function in the company. Risk and return. Working capital management. Management of cash and cash equivalents, accounts receivable and inventories. Analysis of financial ratios. Operational and financial leverage. Analysis of the relations: cost–volume–profit	6, 7, 11, 15, 18, 19, 20 and 25
	Financial management II	General considerations on financial management. Operational performance and financial leverage. Cost and capital structure. Evaluation of companies in Brazil. Economic evaluation of investments	
3- Final phase (semester 7, 8 and 9)	Capital market	Savings. Financial Assets. National Financial Systems. Anonymous society. Investment in the Capital Market. Balance sheet analysis. Economic development and capital markets	8, 9, 10, 17, 21, 23, 24, 26 and 27
	Financial and budget planning	Planning and economic–financial control: functions and principles. Business budgets and projected financial statements: drafting and execution. Budgetary control and analysis of variations	

Table 2.
Relationship between the course phase and the research questions

For the analysis of the data collected, we used descriptive statistics and multivariate analysis techniques. We also evaluated the level of financial education of each individual considering the sum of correct answers, which varies from 0 (individual did not hit any question) to 24 points (individual answered all questions). This is considered the first measure of financial education in research, the quantitative variable.

In order to make the results more robust and to check if the results remain, regardless of the measure used, we developed a second measure of financial education, the qualitative variable. For this, we applied cluster analysis, to classify individuals as to their level of financial education (low and high level). The techniques of hierarchical analysis were applied automatically in Statistical Package for the Social Sciences, configuring the classification in two groups, being used as distance measure the "quadratic euclidian distance" and the "Ward method," like the method of agglomeration (Hair *et al.*, 2018).

Next, we calculate the descriptive statistics of the variables within each cluster, to know the level of financial education of the different groups (gender, income and phase in the course). Moreover, we analyze the association between the profile variables and the level of financial education (contingency tables).

Thereafter, we calculated Pearson's Chi-square (χ^2) measure of association with each group: explanatory variable versus low and high level of financial education. The null hypothesis of the test is that the variables are independent and the alternative hypothesis is that there is a relationship between the variables (Hair *et al.*, 2018).

However, the Chi-square test only reports on the independence between variables but says nothing about the degree of association (Pestana and Gageiro, 2014). Thus, to measure the degree of association between the variables, we present association measures based on Chi-square statistics, these being: Fi and Cramer's V, measures of the degree of association between two categorical variables.

In order to verify if there is a significant difference between the groups, we applied the tests of mean differences, *t*-test and ANOVA and the nonparametric tests of the median difference, Mann–Whitney and Kruskal–Wallis tests. We also performed trend analysis tests, to see if the mean of the groups increases proportionally (Field, 2009).

Finally, we estimated a multiple linear regression model:

$$y_i = \beta_0 + \beta_1 G_{1i} + \beta_2 R2_{2i} + \beta_3 R3_{3i} + \beta_4 R4_{4i} + \beta_5 R5_{5i} + \beta_6 R6_{6i} + \beta_7 R7_{7i} + \beta_8 F2_{8i} + \beta_9 F3_{9i} + \varepsilon_i \quad (1)$$

where y_i represents the level of financial education (quantitative variable, between 0 and 24 points); G_1 corresponds to a dummy variable where $G_1 = 0$ represents the male subject and $G_1 = 1$ represents the female subject. The variables $R2_1$, $R3_3$, $R4_4$, $R5_5$, $R6_6$ and $R7_7$ also consist of dummy variables, so that each corresponds to a level of income investigated. For example, when considering $R2_1$, one has $R2_1 = 1$ when the individual has income between R$954.01 and R$1,908.00. On the other hand, one has $R2_1 = 0$ when the individual has any other level of income. In addition, the independent variables $F2_1$ and $F3_1$ characterize individuals according to the course phase. Thus, considering $F2_1$, we have $F2_1 = 1$ when the student is in the intermediate phase of the course and $F2_1 = 0$ when he is in any other phase. Likewise, when considering $F3_1$, we have $F3_1 = 1$ when the individual is in the final phase and $F3_1 = 0$ when he is in the other phases. Finally, ε_i represents the error term of the model. After the estimation of the model, the four basic assumptions of multiple linear regression model were investigated: homoskedasticity, multicollinearity, autocorrelation and normality of residues (Fávero and Belfiore, 2017).

4. Results and discussions

At the end of the research, 285 valid instruments were collected. Table 3 presents the profile of the respondents.

The sample is gender-balanced, given that 54.70% are male and 45.30% female. Regarding the income of the participants, 41.20% have income between R$4,770.01 and R$14,310.00 and no student has a family income of less than R$954.00.

When analyzing the phase in which the students are within the course, we realize that 43.50% of the interviewees are in the final phase, after the sixth semester of graduation. We emphasize the fact that these students are already in contact with more advanced disciplines, including contents such as financial assets and capital markets. On the other hand, 32.60% are in the initial phase, where they were only exposed to the basic disciplines, which involve content as simple interest and compound. The other 23.90% attend the intermediate phase, which involves the subjects of Financial Administration I and II.

Later we investigated the questions related to the central theme: financial education. For this, the accuracy percentages were investigated in each phase of the course and the Pearson's χ^2 test (Table 4).

Six questions from the instrument used to assess students' financial literacy presented a significant Pearson χ^2 test at the 5% level, indicating an association between the percentage of correct answers and the course phase, demonstrating an increase in the level of financial education with the progression achieved through formal education in higher education.

Then, questions 18 (risk and return), 19 (inflation), 20 (management of credit card) and 25 (interest rate/time value of money), which also presented significant associations, evaluate contents taught in the intermediate phase of the course. Firstly, considering the question of the relationship between risk and return (question 18), 89.60% of phase 2 individuals and 88.70% of phase 3 correctly pointed out that a high rate of return investment will have a high rate of risk, compared to 74.20% of the students in the initial phase. Similarly, question 19, regarding inflation, showed 95.60 and 92.70% accuracy among the individuals in the intermediate and final phases, respectively, demonstrating this knowledge is already disseminated among these students. With this, from the expositions in the classroom, mainly in the finance subjects, the students learned that due to the general increase in the prices of goods and services, when inflation increases, the cost of living also increases. In addition, the level of accuracy exceeds 90% in the second phase because students are exposed to the topic more frequently and intensely. We emphasize that the understanding of risk and return as well as inflation is extremely important for students of business courses, because after graduating they will be constantly making investment and financing decisions. For this,

Variable	Category	Percentage (%)
Gender	Male	54.70
	Female	45.30
Family income	Until R$954.00	0.00
	Between R$954.01 and R$1,908.00	6.40
	Between R$1,908.01 and R$2,862.00	11.70
	Between R$2,862.01 and R$4,770.00	20.20
	Between R$4,770.01 and R$9,540.00	27.00
	Between R$9,540.01 and R$14,310.00	14.20
	More than R$14,310.00	20.60
Phase	Initial	32.60
	Intermediate	23.90
	Final	43.50

Table 3. Profile of the respondents

Phase	Question	Financial topic	Hit percentage Initial phase (1)	Intermediate phase (2)	Final phase (3)	Pearson's *p*-value
1	4	Interest rate	89.10%	94.10%	85.50%	0.192
	5	Interest rate	64.50%	67.20%	65.30%	0.940
	12	Interest rate	69.60%	79.40%	81.30%	0.112
	13	Discount	93.50%	98.50%	96.80%	0.239
	14	Basic arithmetic	96.80%	97.10%	98.40%	0.723
	16	Interest rate	94.60%	100.00%	95.90%	0.171
	22	Consumer right	93.50%	94.10%	94.40%	0.969
2	6	Time value of money	38.70%	47.80%	51.60%	0.164
	7	Inflation/interest rate	67.70%	77.90%	75.60%	0.278
	11	Interest rate/time value of money	58.10%	73.50%	67.70%	0.106
	15	Inflation	76.90%	82.40%	87.00%	0.157
	18	Risk and return	74.20%	89.60%	88.70%	0.006
	19	Inflation	83.90%	95.60%	92.70%	0.024
	20	Management of credit card	55.90%	83.80%	80.60%	0.000
	25	Interest rate/time value of money	39.10%	44.10%	57.30%	0.023
3	8	Financial assets	33.30%	31.30%	31.10%	0.937
	9	Financial assets	89.20%	95.60%	90.30%	0.333
	10	Diversification	71.00%	85.10%	88.70%	0.003
	17	Inflation/market knowledge	16.30%	14.70%	24.20%	0.187
	21	Budget	94.60%	97.10%	96.80%	0.649
	23	Financial risk	58.20%	69.10%	66.10%	0.313
	24	Savings	45.70%	48.50%	54.00%	0.458
	26	Financial risk	18.50%	19.10%	21.80%	0.815
	27	Diversification	42.40%	48.50%	68.30%	0.000

Table 4.
Percentage of accuracy per question, considering the three phases of the course

these professionals will need to understand which investments are good and which are bad for their particular business.

Question 20 considers the knowledge about interest incurred on the credit card. In this question, we visualize those belonging to the first phase presented a discrepant percentage of the other groups since only 55.90% of the individuals in phase 1 correctly pointed out that whenever someone pays the minimum amount on their credit card bill and is subject to interest on the remaining balance. On the other hand, 83.80 and 80.60% of the individuals in the intermediate and final phases, respectively, obtained positive results.

Finally, question 25 involves knowledge that encompasses compound interest rates and the time value of money. When asked how long it would take for the amount of a loan to double, only 39.10% of the participants in the initial phase estimated the time correctly, against 44.10 and 57.30% of the individuals in the intermediate and final phases, respectively. In this perspective, we point out that although there is an increase in the percentage of success from phase 2 of the course, this percentage remains low, since it does not exceed 60%. Then, the course provides a gain in the level of financial education of individuals; however, there is still space to be expanded and improved, given the low level of success, including those in the final stages of the course.

As the student learns about company valuation in financial management subjects, he learns that the future value of cash flows needs to be brought to present value discounted at an interest rate that pays the invested capital. At that moment, the student learns that the

amount of cash generated at a future date does not represent the same amount at present. This difference is called time value of money. On the other hand, before learning about time value of money, in the initial disciplines of financial mathematics, students learn to calculate simple and compound interest, as well as to understand how loans and discounts work. However, due to the results presented, the students did not present good results in this question even with all these topics seen during the course.

In this perspective, besides the questions that presented the test of significant association, we highlight those that presented unsatisfactory results. Questions 6 (time value of money), 8 (financial assets), 17 (inflation/market knowledge), 24 (savings) and 26 (financial risk) presented scores less than 50% of respondents. These results express concern because knowing the current inflation rate is essential knowledge for financial decision-making, starting with acquiring a loan until the investment decisions in the financial market.

Subsequently to this, some questions presented higher success rates among those belonging to the intermediate phase of the course or, even more, presented greater discrepancies between phase 1 and phase 2 to the detriment of the advance from phase 2 to phase 3, such as questions 7 and 11.

Another observation that deserves attention is the fact that the other questions of the instrument (such as questions from the first phase: 13-discount, 14-basic arithmetic, 16-interest rate and 22-consumer right) presented high achievement percentages (above 90%) in all phases of the course. Thus, is this scenario, we can make the assumption that these individuals acquired, for example, the knowledge of discount, basic arithmetic, interest rate and consumer right, in the first phase and maintained it over time. Question 12, which is also about interest rates, presents constant results, that is, individuals tend to maintain this knowledge over time.

On the other hand, question 4, which also asks about interest rates, shows an increase in the percentage of correct answers from phase 1 to phase 2, but this percentage falls in phase 3. This may have happened because students found the question too difficult or else because they lost this knowledge over time. Question 5, in contrast, has a similar behavior, but in a lighter way.

In summary, we verified that taking a business course seems to be related to a higher level of financial knowledge on issues such as credit card management, inflation, risk and return and diversification, topics that showed significant differences throughout the course. Besides that, with some content learned in the first phase of the course, there is a tendency for continuity in learning when passing the stage, justified by the fact that many financial disciplines require previous ones as a prerequisite. However, there are other concepts, such as interest rate, which has a higher percentage of correct answers in the group that is in the second phase, because in the last phase of the course, the subjects do not use this concept and the students seem to forget such knowledge learned. This finding corroborates the results of Fernandes *et al.* (2014), when stating that as other education, financial education decays over time.

After discovering the percentage of correctness of the participants regarding financial education issues and to verify if there is a significant mean difference between the profile groups, we apply the mean difference tests (*t*-test and ANOVA). Alternatively, nonparametric median difference tests (Mann–Whitney and Kruskal–Wallis tests) (Table 5) were also performed. In addition, we performed trend analysis tests, to look for linear trends, that is, if the mean of the groups increases proportionally.

We verified that the parametric and nonparametric tests presented similar results. First, there was no difference in the mean of 5% for the level of financial education according to the students' family income, which is the average financial education is similar for different levels of income. However, the stage in which the student is in the course, as well as the student's gender, presented significant mean differences. The men presented an average of 17.53 in the questions of financial education, against the average of 15.98 presented by the women.

Variable	Category	Financial education Mean	Median	Standard deviation	[p-value] *	[p-value] **	Linear trend [p-value]
Gender	Male	17.53	18	3.28	0.000	0.000	–
	Female	15.98	16	3.33			
Family income	Between R$954.01 and R$1,908.00	16.22	16	3.64	0.062	0.121	0.090
	Between R$1,908.01 and R$2,862.00	15.70	17	3.67			
	Between R$2,862.01 and R$4,770.00	16.67	17	3.60			
	Between R$4.770,01 and R$9,540.00	17.47	18	2.83			
	Between R$9,540.01 and R$14,310.00	16.25	17	4.11			
	More than R$14,310.00	17.48	18	2.89			
Phase	Initial	15.56	16	3.48	0.000	10.000	0.000
	Intermediate	17.29	18	2.91			
	Final	17.55	18	3.31			

Note(s): *Mean difference test for normal samples (Student t-test and ANOVA); **Median difference test for nonnormal samples (Mann–Whitney U test and Kruskal–Wallis test)

Table 5.
Test of average difference for the level of financial education according to gender, income and the phase in the course

Besides, the linear trend test indicated that the average financial education of the groups increases in proportion to the progression in the course. This result corroborates the fact that the number of subjects related to the financial area also has a strong link with the level of financial education, as evidenced by Amadeu (2009).

We applied cluster analysis to classify individuals into a low and high level of financial education. Afterward, we calculated the descriptive statistics within each cluster, to know the level of financial education of the two groups (Table 6).

We observed that most of the students presented a high level of financial education (67.70%). Also, considering the average of each group, students classified with a low level of financial education (cluster 1) obtained a mean score of 12.84. Thus, they matched, on average, 13 out of the 24 proposed financial education questions. On the other hand, considering individuals with a high level of financial education, an average of 79.17% of the correct answers was observed, and those holders of a low level obtained an average of 54.17% of hits.

Next, the frequency distribution of the variable financial education with the variables gender, income and stage within the undergraduate course is presented in Table 7. Besides the measure of Pearson's Chi-square association between the groups, Cramer's Fi and V statistical tests were performed.

We found a statistically significant association relationship at the 1% level between financial education and gender, as well as we found it between financial education and the course phase. However, income did not present significant associations. Regarding gender, there is a higher proportion of men with a high level of financial education (78.90%) than

Financial education level	Percentage (%)	Average financial education	Standard deviation
Low (cluster 1)	32.30	12.84	2.25
High (cluster 2)	67.70	18.75	1.80

Table 6.
Descriptive statistics by a cluster of financial education

Variable	Category	Low level (Cluster 1 %)	High level (Cluster 2 %)	χ^2 Pearson [p-value]	Fi/V of Cramer
Gender	Male	21.10%	78.90%	0.000	0.000
	Female	46.00%	54.00%		
Family income	Between R$954.01 and R$1,908.00	33.30%	66.70%	0.153	0.153
	Between R$1,908.01 and R$2,862.00	42.40%	57.60%		
	Between R$2,862.01 and R$4,770.00	38.60%	61.40%		
	Between R$4.770,01 and R$9,540.00	23.70%	76.30%		
	Between R$9,540.01 and R$14,310.00	40.00%	60.00%		
	More than R$14,310.00	24.10%	75.90%		
Phase	Initial	48.40%	51.60%	0.000	0.241 0.000
	Intermediate	26.50%	73.50%		
	Final	23.40%	76.60%		

Table 7.
Profile of the students according to the level of financial education and measures of association

women (54.00%), confirming previous studies that point to lower education for women (Kadoya and Khan, 2017; Scheresberg, 2013).

The main variable that was the phase of the course presented the association with the educational level. Among the students in the initial stages, we noticed that the sample was well distributed in relation to the level of financial education, given that 51.60% have a high level and 48.40% are in cluster 1 (low level). On the other hand, when considering the intermediate and the final phase, we observed a higher proportion of students in cluster 2, who have the highest levels of financial education. Thus, there is an increase in the proportion of students in the high level of financial education as the phases progressed. This is already an indication that business courses are related to the increase in the level of financial education of individuals, which may be due to the fact that they are more exposed to finance disciplines as the course progresses.

Regarding the degree of these associations, for the gender variable, we analyzed the statistical test *Fi*, which was significant at the 1% level. As for the income and phase variables, we used Cramer's *V*, which revealed significant results only for the course phase. In addition, the degrees of association of the two significant variables were similar, being 0.266 for the genus and 0.241 for the phase. Although significant, these degrees of association are considered mild.

We then investigate the impact of the variables studied on the level of financial education of students. We performed multiple linear regression, so gender, income and the phase were considered independent explanatory variables and the level of financial education (quantitative variable, between 0 and 24 points) was the dependent variable (Table 8). Dummy variables were created for each income category and the phases in the course.

First, we highlight the R^2 of the model, which indicates that the independent variables of the model can explain 13.30% of the variance in the level of financial education. In addition, the model presented statistical significance at the 1% level.

Regarding the assumptions of the model, we first have the question of homoskedasticity. Thus, we emphasize the nonrejection of the null hypothesis (p-value 0.269), that is, attestation of the homoskedasticity of the residues. In addition, there is no autocorrelation of residues, since the Durbin–Watson test value (1.782) was within the range considered adequate. To verify multicollinearity, we use the VIF and tolerance indices. The results show values close

Table 8.
Multiple linear regression model of financial education

Variable	Financial education Standardized coefficients	*p*-value
Gender	−0.245	0.000
Income between R$954.01 e R$1,908.00	0.083	0.564
Income between R$1,908.01 e R$2,862.00	0.039	0.830
Income between R$2,862.01 e R$4,770.00	0.147	0.516
Income between R$4,770.01 e R$9,540.00	0.272	0.273
Income between R$9,540.01 e R$14,310.00	0.089	0.651
Income above R$14,310,00	0.222	0.329
Intermediate phase	0.233	0.000
Final phase	0.295	0.000
R^2	0.133	
F-test	5.729	
p-value	0.000	

to 1, confirming the absence of multicollinearity. Finally, by analyzing the normality of the residues, we performed the Kolmogorov–Smirnov test, which resulted in a value of 0.067 and *p*-value of 0.004, indicating the nonnormality of the residues. Considering the results obtained for the independent variables, no income dummy variable had a significant impact and from this, having a higher or lower family income did not influence the students to obtain higher levels of financial education.

Subsequently, being female has an impact of −0.245 on the level of financial education; that is, women have lower levels compared to men. This result was already expected given the consensus in the literature that males have higher levels of financial education.

Finally, the phase that the student is in the undergraduate course also had a significant impact on the level of financial education. The results show that being in the intermediate phase of the course affects on 0.233 in the level of financial education, as being in the final phase impacts in 0.295 more than those students in the initial phase of the course. With this, the third phase of the course presents an increase in the level of financial education higher than the second phase of the course. This may be due to the greater complexity of the topics covered in the third phase, such as capital markets, budget, diversification, market knowledge, financial risk and savings. From the moment that students are acquiring this knowledge, it is possible to state that they have already been in contact with most topics of personal finance, which allows a more complete view of financial issues.

This fact proves the importance of formal education for the financial education of individuals, especially when it comes to business education. We found that a degree with subjects related to the financial area has an even greater impact on those who are submitted to it, given the results found. As the student progresses in the course phase and, as a consequence, has contact with a greater number of financial disciplines, his level of financial education increases linearly. Thus, there is a relationship between the level of exposure to financial education and the level of personal financial education.

5. Final considerations

Financial education is increasingly recognized as an essential component of economic and financial balance for businesses and families to face increasingly complex and sophisticated markets. In this scenario, the main objective of this study was to evaluate the effect of formal and business education on the level of financial education. We also verified the level of financial education of the students and the existence or not of financial education differences according to gender and family income.

As main results, although some questions present high achievement percentages in all phases of the course, six questions presented an association between the success percentage and the phase in the course, with a higher percentage of accuracy in the intermediate and final phases of the course. Thus, there is a first evidence that during the course, the financial knowledge level increases. With the progress achieved through formal education, the level of financial education of individuals also increases.

However, the issues that presented unsatisfactory results deserve attention. Five questions presented accuracy scores of less than 50% of the respondents, with inflation being the most worrisome question, since only about 20% of the students were able to answer the accumulated rate of inflation of the previous year in Brazil. This fact requires special attention from both governments and universities since the curricular matrix of undergraduate courses should follow the economic, social and political context in which individuals meet. By doing so, by completing an undergraduate course, specifically with subjects related to finance, individuals should master recurring themes in financial life.

The family income is not determinant of the level of financial education of the university students, proving that when they enter higher education, the formal education received is the same independent of income. Additionally, men hold the highest levels of financial education, and there is an increase in the proportion of high-level academics as there is a progression in the phases studied. Thus, more educated respondents formally obtain higher scores of financial education; that is, the level of financial education differs significantly depending on the level of formal education.

This study reinforces the importance of formal education for the financial education of the population, especially business education. As the student progresses in the course periods, the number of financial subjects studied increases and, consequently, the exposure to financial education increases, the level of personal financial education expands linearly.

Thus, this article demonstrated that the trajectory of the knowledge traversed by individuals within the same level of schooling is of paramount importance. The results show that formal education can improve the levels of financial education and reinforce the relevance of strategic actions developed in Brazil, such as the recent insertion of the subject in the National Curricular Common base (BNCC) and the National Strategy of Financial Education (ENEF).

It should also be noted that even considering the rigor of the applied methods, certain limitations were observed, such as using the nonrandom sample. The results found correspond to the students of the Federal University of Santa Catarina, in Brazil, and cannot be generalized for all business courses. Therefore, it is important that future studies investigate other business courses to compare the results found and investigate the knowledge of other students. It would also be interesting to investigate courses that do not have finance disciplines, in order to understand more fully the contributions of business courses.

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Appendix

Translated instrument

(1) Gender: 1.1 ( ) Male. 1.2 ( ) Female.

(2) Semester:_____.

(3) What is approximately the total monthly income of your family, adding all sources, such as salary, pension, retirement, social benefits, rents, nozzles?

3.1 ( ) Until R$ 954.00. 3.2 ( ) Between R$ 954.01 and R$ 1,908.00.
3.3 ( ) Between R$ 1,908.01 and R$ 2,862.00. 3.4 ( ) Between R$ 2,862.01 and R$ 4,770.00.
3.5 ( ) Between R$ 4,770.01 and R$ 9,540.00. 3.6 ( ) Between R$ 9,540.01 and R$ 14,310.00.
3.7 ( ) More than R$ 14,310.00.

(4) Suppose you had $100 in a savings account and the interest rate was 2% per year. You do not make any other deposit, nor do you withdraw any money from this account. How much would you have in this account at the end of the first year, relying on interest?

4.1 ( ) R$ 98.00. 4.2 ( ) R$ 100.00. 4.3 ( ) R$ 102.00. 4.4 ( ) R$ 120.00. 4.5 ( ) I don't know.

(1) And how much money will you have in your account in five years from now, if you also do not make any deposit or withdrawal in the period?

5.1 ( ) More than R$ 110.00. 5.2 ( ) Exactly R$ 110.00. 5.3 ( ) Less than R$110.00.
5.4 ( ) It is impossible to say from this information. 5.5 ( ) I don't know.

(5) Assume that José inherits R$ 10,000.00 today and Pedro inherits R$ 10,000.00 in three years. Because of the inheritance, who will become richer?

6.1 ( ) José. 6.2 ( ) Pedro. 6.3 ( ) They are equally rich. 6.4 ( ) I don't know.

(6) Imagine that the interest rate on your savings account was 6% per year and inflation was 10% per year. After one year, would you be able to buy (consider that it has not been deposited or withdrawn):

7.1 ( ) More than today. 7.2 ( ) Exactly the same as today. 7.3 ( ) Less than today. 7.4 ( ) I don't know.

(7) Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return?

8.1 ( ) Savings accounts. 8.2 ( ) Stocks. 8.3 ( ) Bonds. 8.4 ( ) I don't know.

(8) Normally, which asset displays the highest fluctuations over time?

9.1 ( ) Savings accounts. 9.2 ( ) Stocks. 9.3 ( ) Bonds. 9.4 ( ) I don't know.

(9) When an investor spreads his money among different assets, does the risk of losing money:

10.1 ( ) Increase. 10.2 ( ) Decrease. 10.3 ( ) Stay the same. 10.4 ( ) I don't know.

(10) A 15-year loan requires monthly payments greater than a 30-year loan, but the total interest paid at the end of the loan will be less. This statement is:

11.1 ( ) True. 11.2 ( ) False. 11.3 ( ) I don't know.

(11) Let's assume that you took a bank credit of R$10,000.00 to be paid back during a year in equal monthly payments. The credit charge is R$ 600.00. Give a rough estimate of the annual interest rate on your credit. The interest rate is about:

12.1 ( ) 0.3%. 12.2 ( ) 0.6%. 12.3 ( ) 3%. 12.4 ( ) 6%. 12.5 ( ) I don't know.

(12) Let's assume that you saw a TV set of the same model on sale in two different shops. The initial retail price of it was R$1,000.00. One shop offered a discount of R$150.00, while the other one offered a 10% discount. Which one is a better bargain?

13.1 ( ) A discount of R$150.00. 13.2 ( ) A 10% discount. 13.3 ( ) I don't know.

(13) Imagine that five brothers are given a gift of R$1,000.00. If the brothers have to share the money equally how much does each one get?

14.1 ( ) R$ 100.00. 14.2 ( ) R$ 200.00. 14.3 ( ) R$ 1,000.00. 14.4 ( ) R$ 5,000.00. 14.5 ( ) I don't know.

(14) Now imagine that one of your friends received the money and stored it in your safe at home. Considering that inflation is 5% per year, after one year he will be able to buy:

15.1 ( ) More than he would buy today. 15.2 ( ) Less than it would buy today.
15.3 ( ) Same amount as he would buy today. 15.4 ( ) I don't know.

(15) Suppose you borrowed R$ 100 from a friend and after a week you paid R$ 100 (one hundred reais). How much interest are you paying?

16.1 ( ) 0%. 16.2 ( ) 1%. 16.3 ( ) 2%. 16.4 ( ) I don't know.

(16) In Brazil, the accumulated inflation rate closed 2017 at what level?

17.1 ( ) 0%. 17.2 ( ) Between 1 and 4%. 17.3 ( ) Between 5 and 8%. 17.4 ( ) Between 9 and 12%. 17.5 ( ) I don't know.

(17) An investment with high rate of return will have high risk rate. This statement is:

18.1 ( ) True. 18.2 ( ) False. 18.3 ( ) I don't know.

(18) When inflation increases, the cost of living rises. This statement is:

19.1 ( ) True. 19.2 ( ) False. 19.3 ( ) I don't know.

(19) Whenever someone pays the minimum amount of the credit card bill is subject to interest on the remaining balance. This statement is:

20.1 ( ) True. 20.2 ( ) False. 20.3 ( ) I don't know.

(20) A good way to control the monthly expenses is to make a budget. This statement is:

21.1 ( ) True. 21.2 ( ) False. 21.3 ( ) I don't know.

(21) It is a basic consumer right to have clear information on spot price and interest included in the forward sale. This statement is:

22.1 ( ) True. 22.2 ( ) False. 22.3 ( ) I don't know.

(22) There's a 50/50 chance that Malik's car will need engine repairs within the next six months, which would cost $1,000.00. At the same time there is a 10% chance that he will need to replace the air-conditioning unit in his house, which would cost $4,000.00. Which poses the greater financial risk for Malik?

23.1 ( ) The car repair. 23.2 ( ) The air conditioning replacement.
23.3 ( ) There is no way to tell in advance. 23.4 ( ) I don't know.

(23) Anna saves R$500 each year for ten years and then stops saving additional money. At the same time, Charlie saves nothing for ten years but then receives a R$5,000.00 gift, which he decides to save. If both Anna and Charlie earn a 5% return each year, who will have more money in savings after 20 years?

24.1 ( ) Anna. 24.2 ( ) Anna and Charlie will have the same amount. 24.3 ( ) Charlie. 24.4 ( ) I don't know.

(24) Jose owes R$1,000.00 on a loan that has an interest rate of 20% per year compounded annually. If he makes no payments on the loan, at this interest rate, how many years will it take for the amount he owes to double?

25.1 ( ) Less than 5 years 25.2 ( ) 5–10 years 25.3 ( ) More than 10 years 25.4 ( ) I don't know.

(25) Investment A will deliver a return of either 10% or 6%, with each outcome equally likely. Investment B will deliver a return of either 12% or 4%, with each outcome equally likely. You can expect to earn more by investing in which?

26.1 ( ) Investment A. 26.2 ( ) Investment B.
26.3 ( ) I does not matter – expected return is the same with each. 26.4 ( ) I don't know.

(26) You can reduce the risk of investing in the stock market by buying a wide range of stocks. This statement is:

27.1 ( ) True. 27.2 ( ) False. 27.3 ( ) I don't know.

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