

## The impact of financial education on teachers' financial knowledge

Kurt A. Schindler,<sup>1,A</sup> Rogelio J. Cardona,<sup>1,B</sup>

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<sup>1</sup>University of Puerto Rico, Río Piedras Campus, Puerto Rico

<sup>A</sup>kurt.schindler@upr.edu | <https://orcid.org/0000-0002-3871-4450>

<sup>B</sup>rogelio.cardona1@upr.edu | <https://orcid.org/0000-0002-4896-5077>

### ■ ABSTRACT

This study examines effective financial education teaching skills among a group of elementary school teachers using a specially designed composite financial literacy score. Data were collected via a 31-hour training program. The aggregate score considers financial self-efficacy, subjective financial knowledge, and financial behavior. We find that this score is correlated with net worth, personal finance training and teaching personal finance. In addition, our findings suggest a direct relationship between financial self-efficacy, subjective financial knowledge, and financial satisfaction with higher levels of positive financial behavior. These results contribute to a growing body of literature on financial knowledge since Puerto Rico is usually not included in this type of research in the U.S.

**Keywords:** financial knowledge, financial behaviors, teacher training, Puerto Rico, financial efficacy

### El impacto de educación financiera en el conocimiento financiero de maestros

### ■ RESUMEN

Este estudio examina las habilidades efectivas de enseñanza de educación financiera entre un grupo de maestros de escuela primaria utilizando un puntaje compuesto de educación financiera especialmente diseñado. Los datos fueron recopilados a través de un programa de entrenamiento de 31 horas. El puntaje agregado considera la autoeficacia financiera, el conocimiento financiero subjetivo y el comportamiento financiero. Encontramos que este puntaje está

correlacionado con el patrimonio neto, la capacitación en finanzas personales y la enseñanza de finanzas personales. Además, nuestros hallazgos sugieren una relación directa entre la autoeficacia financiera, el conocimiento financiero subjetivo y la satisfacción financiera con niveles más altos de comportamiento financiero positivo. Estos resultados representan una aportación a un creciente cuerpo de literatura sobre conocimiento financiero, ya que Puerto Rico generalmente no está incluido en este tipo de investigación en los EE. UU.

**Palabras clave:** conocimiento financiero, comportamiento financiero, adiestramientos docentes, Puerto Rico, eficacia financiera

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## Introduction

Innovation in the financial markets presents consumers with an ever-increasing number and complexity of products and services to manage their personal finances. As a public policy implemented globally (Organization for Economic Cooperation and Development, hereafter OECD, 2017), financial education focuses on improving financial literacy and helping individuals make better economic decisions.

The increased emphasis on financial education has focused on increasing student knowledge to improve their financial acumen. However, declining financial knowledge test scores (Fariella et al., 2017; Financial Industry Regulatory Authority Investor Education Foundation, hereafter FINRA Foundation, 2021) have raised concerns regarding the effectiveness of the teaching skills of educators. The focus of financial education needs to shift to the educator before evaluating student outcomes. Several authors have indicated that effective teaching of personal finance involves several factors, such as financial knowledge, financial self-efficacy, and financial capability (Asiseh & Williams, 2015; Blazar & Kraft, 2017; De Moor & Verschetze, 2017). Asiseh and Williams (2015) posit that financial education criteria offer little or no professional development or training for educators to examine the content they will be required to present to students. Blazar and Kraft (2017) indicate that delivering accurate content is one of the key dimensions of teaching, while De Moor and Ver-

schetze (2017) speculate whether teachers themselves are sufficiently financially literate to teach personal finance. De Moor and Verschete found that approximately 40% of teachers considered themselves unprepared to teach financial literacy. Asiseh and Williams (2015) surveyed K-12 teachers in North Carolina and found that 80% of respondents understood that financial literacy should be taught at the K-12 level, yet less than 19% indicated that they felt prepared to teach these concepts. De Moor and Verschete propose three interrelated aspects of financial literacy: financial knowledge, attitudes, and behaviors. Since the end goal of financial education is to impact student financial behaviors, understanding the components of effective teaching is crucial in preparing educators.

This study aims to measure the potential components of effective teaching skills of financial educators through a composite score that includes the following variables: financial knowledge, financial self-efficacy and financial literacy, and the relationships between these variables. According to Nejad and Javid (2018), financial knowledge is “the fundamental knowledge and skills that capture one’s ability to make informed and effective personal financial and economic decisions by understanding how money works” (p. 785). Financial knowledge can be either subjective, i.e., how much one believes he or she knows, or objective, i.e., measured by the total number of correct answers provided to personal finance questions. This research uses questions gathered from different sources and educational materials. Subjective financial knowledge is considered significant in decisions such as using payday loans or other predatory financial products (Lee et al., 2019) and is measured on a 10-point Likert scale. We find that subjective financial knowledge is an important determinant of financial behaviors.

Bandura (1993) noted that self-efficacy, which is more than confidence, is the belief that one can contribute to an outcome because of one’s actions. The scale developed by Lown (2011) measures a respondent’s level of financial self-efficacy and consists of six questions on a four-point Likert scale. Cronbach’s alpha is

calculated to measure how reliable the scale is in measuring the underlying concept or internal consistency. Translating Lown's scale (2011) to Spanish, we find that the reliability is similar. We also find that financial self-efficacy is a significant determinant of financial behaviors.

Financial behaviors, what individuals do to maintain their finances, can be viewed as either positive (improving one's financial situation) or negative (worsening one's financial situation), according to Kaiser and Menkoff (2017). Financial behaviors can also be short-term or long-term (Wagner & Walstad, 2018). This study measures financial behaviors via a series of nine questions taken or derived from a cross-section of financial education programs such as the Personal Management Merit Badge (Boy Scouts of America, 2003), the National Financial Capability Study (FINRA Foundation, 2018), as well as researchers in the field of financial behaviors (Allgood & Walstad, 2018; Mandell, 2008). The answers to all the questions generate a financial behavior score. Understanding the determinants of financial behaviors is necessary to achieve the goal of impacting student behaviors. We perform a multiple regression analysis to measure the determinants of positive financial behaviors.

Financial literacy (sometimes described as financial capability) has two main dimensions: understanding and application (De Beckker et al., 2019). The OECD (2017) defines financial literacy as a combination of "awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions" (p. 50). De Moor and Verschete (2017) indicated that attitudes and behaviors, in addition to financial knowledge, are necessary to measure financial literacy. In this study, financial literacy includes a combination of self-efficacy, subjective financial knowledge, and financial behaviors. We measure financial literacy through the construction of a scale using factor analysis. Our evidence includes a calculation of Cronbach's alpha to determine the scale's internal consistency, which was within generally accepted parameters. We find that higher levels of financial literacy are associated with higher levels of net worth, having

taken a class in personal finance and having experience teaching personal finance.

The rest of the paper is organized as follows. In the next section, we examine the background literature. The following sections present a description of the methodology employed, the data-gathering process, results, and implications. The paper ends with our conclusions, research limitations, and suggestions for future research.

### **Literature Review**

Recent studies have indicated that the level of financial knowledge has been decreasing even as the number of financial education programs has proliferated. The focus on educator preparation for teaching courses in personal finance is beginning to generate increased attention from researchers (Asiseh & Williams, 2015; De Beckker, et al., 2019). De Beckker et al. (2019) state that quality teachers are a necessity for effective financial education. Subject matter preparation has been studied in teacher preparedness research, mainly in mathematics and science (Hoover et al., 2016). Asiseh and Williams (2015) noted that when financial education is added to the education curricula, it is usually done in mathematics or social studies, with little or no training related to teaching personal finance concepts. De Beckker et al. (2019) observed that teacher quality plays a crucial role in student learning. Bates et al. (2011) examined 89 preservice teachers and concluded that content knowledge increases teacher efficacy in the subject. Blazar and Kraft (2017) indicated that content-specific teaching practices help develop student behaviors in mathematics. The authors studied 310 fourth and fifth-grade teachers over three years using the Mathematical Quality of Instruction instrument. Blazar and Kraft found a strong correlation (as measured by Pearson's correlation coefficient ( $R$ ) of .74) between the teacher's mathematical knowledge and students' math achievements. The Puerto Rico Department of Education encourages teacher preparation in personal finance, and the subject group for this study

included math and social studies teachers (Gobierno de Puerto Rico [Government of Puerto Rico], 2019). In a meta-study on the links between financial education and future financial behaviors, Hensley (2015) asserted that a more accurate examination of factors that impact program effectiveness is needed.

Content knowledge is not the only determinant of teaching capacity. Bandura (1993) noted that teachers with a higher teaching efficacy impact students' intellectual capability due to their efforts in their teaching activities. Asiseh and Williams (2015) performed an online survey of 321 K-12 teachers in North Carolina and observed that the level of importance assigned by a teacher to the topic of personal finance will impact the effort made into teaching the course and, as a result, students will be able to apply what they have been taught in their daily lives. De Beckker et al. (2019) studied 300 teachers in Flanders (Belgium) and noted that they need to feel confident regarding their ability to provide financial education since it has been shown to have a positive effect on instructional behaviors and student learning.

Groneman-Hite et al. (2015) noted that financial education standards exist in 44 states in the United States in different grade levels. In their study, the authors used Kansas as a proxy for the whole U.S. and collected data from K-12 schools throughout the state. Groneman-Hite et al. posit that teacher competence regarding personal finance topics is vital for any student financial education program. This issue is not only applicable in the U.S. but worldwide. García et al. (2013) identified three projects in South America that focus on teacher preparation, and found that teacher training is a key element in disseminating financial education programs for students. In another study performed in Taiwan, Deng et al. (2013) found a positive correlation between a teacher's level of financial literacy and their teaching of financial education in the classroom. The authors collected data from 494 public elementary school teachers using two self-designed questionnaires: financial literacy and financial education teaching. De Beckker et al. (2019) indicated that financial literacy could only be appropriately measured by evaluating financial attitudes

and behaviors. However, teachers may still not be prepared. De Moor and Verschetze (2017) noted that even student teachers do not have sufficient financial knowledge to satisfactorily teach financial literacy. Sawatzki & Sullivan (2017) analyzed 35 teachers in Australia and found that only half of the teachers acknowledged they felt confident about teaching personal finance, even though three-quarters admitted that they were financially literate.

It is generally accepted that students learn by observing, practicing, and intentional teaching moments (McDonald, 2018). Teachers can create these teaching moments by living positive financial behaviors daily and bringing these experiences into the classroom as role models. Researchers have looked at drivers of financial behaviors. Tang et al. (2015) concluded that financial knowledge is not the only critical driver of positive financial behaviors. Susilowati et al. (2017) examined Indonesian college students and observed that an individual's confidence regarding money could affect their behavior. Lown (2011) and Topa et al. (2018) also studied how experience, efficacy, and other psychological factors may influence financial behaviors.

Bansilal et al. (2012) examined the importance of content and context when teaching mathematics. This combination can be applied to personal finance since the content is important and more valuable when done in the context of daily financial behaviors. In essence, teachers must practice what they are teaching to instill the use of personal finance topics in everyday life. O'Brien and Blue (2018) suggested that the difference between education and schooling is that the former includes the ability of students to engage in the experience of learning. Way and Holden (2009) asserted that teachers educate students in critical thinking and decision-making regarding personal finance with the examples they discuss in the classroom. Teaching has been described as multidimensional, and teachers' teaching practices and behaviors can influence their students' behaviors (Blazar & Kraft, 2017). Positive financial behaviors are critical as it has also been considered that the individual nature of personal finance may affect the ability to

explain the subject matter without bias (Bates et al., 2011).

Teachers may be well positioned to add to the resources available for student financial education. Some researchers have stated that the classroom environment significantly influences students' financial socialization development (Brewton & Danes, 2011). Modeling and observations are critical forms of student learning. Therefore, teacher financial behaviors can be expected to impact student learning. Given the implications and possible consequences of teacher financial behaviors, it is vital to understand the determinants of good financial practices or behaviors.

The academic studies discussed in this section present an overview of the financial education literature. The following section presents our research questions.

### **Research Questions**

Based on the evidence from previous studies, we proposed the following research questions:

1. What is the current level of educator financial knowledge in Puerto Rico?
2. How can we improve the financial knowledge possessed by educators?
3. How can we measure the financial literacy of educators?
4. How can we investigate (or document) the potential determinants of the financial behaviors of educators?

### **Methodology**

#### **Data Collection**

Like many other states and jurisdictions, Puerto Rico has begun implementing personal finance in its education curricula. We developed a three-week immersion workshop to provide 4th, 5th, and 6th grade Social Studies and Mathematics teachers with teaching skills in financial education. The workshop's program had teachers stay on-site at a local hotel from

Friday evening to Sunday afternoon during the first weekend and then return on two consecutive Saturdays. The program encompassed 31 hours of instructional workshops, group activities, panel presentations, and informal topic discussions. Other researchers have found that training programs lasting longer than 14 hours have a sustained impact on teacher performance (Compen et al., 2019).

The opening session on the first Friday was a plenary session to discuss project rules and responsibilities, and provide an overview of financial education in Puerto Rico, the United States, and other parts of the world. In addition, all the participants received initial data forms with the related instructions. The data in this study was collected via a pre-test of 75 questions on personal finance topics given on the first day of the program, along with a detailed survey with questions on financial satisfaction, financial behaviors, subjective financial knowledge, financial self-efficacy, and socioeconomic and demographic information. The completed data sheets were coded and manually entered into an Excel® spreadsheet and subsequently imported into the statistical software program Statistical Package for the Social Sciences (SPSS).

Our program was styled in the manner of a professional conference—two plenary workshops and six smaller groups in three concurrent sessions. The topics discussed in the six concurrent sessions were: (a) financial responsibility, (b) economic concepts, (c) income, expenses, savings, and investments, (d) credit, debts, and forms of payment, (e) short- and long-term goal setting, and (f) budgeting and financial management. Workshop participants took a post-test of 75 questions on personal finance on the last day of the final weekend.

### **Principal Components Analysis**

We performed a principal component analysis (PCA) to identify and calculate a composite score to measure financial self-efficacy and financial literacy. PCA allows us to analyze large data sets and transform the variables into smaller ones to facilitate

their analysis with a partial loss of accuracy (Jaadi, 2022). If more than one variable (or factor) is identified, an adjustment called varimax rotation is necessary to transform the initial factors into easier interpretation. In addition, the Kaiser-Meyer-Olkin (KMO) index is used to demonstrate whether factor analysis is appropriate for our data as it measures the sampling adequacy for each variable. The KMO value measures the proportion of variance among variables that might be common variance (Glen, n.d.). KMO values between 0.7 and 0.8 are deemed good, while values greater than 0.8 are considered excellent (Nunes et al., 2020).

Scale reliability is calculated for the financial self-efficacy scale and the financial literacy scale by measuring the internal consistency or how closely related the set of items is. To measure reliability, we calculate Cronbach's alpha for each item. The general rule of thumb to interpret this value considers values higher than .700 acceptable (Webb, 2011).

We performed an ordinary least squares (OLS) regression analysis to analyze the determinants of financial behaviors. This analysis allows us to identify the relationship between each independent variable and the dependent variable. The p values for the coefficient tell us whether the relationships are statistically significant.

### **Objective Financial Knowledge**

The workshop had 488 participants, of which 453 (93%) completed the pre-test and 348 (71%) completed the post-test. The discrepancy in the number of responses is due to lower attendance on the last weekend of the program. To measure the participants' financial knowledge change, we performed two paired sample t-tests using only the 267 pre and post-tests that were matched via their identification codes. The remaining tests could not be matched.

### **Financial Satisfaction**

We use a Likert scale to ask the participants their level of financial satisfaction, ranging from 1 (very dissatisfied) to 10 (very sat-

isfied), with a higher score indicating a higher level of financial satisfaction. Since this measure is a one-item scale, no reliability data was available. The use of a one-item indicator for financial satisfaction is common in the financial literature (Owusu, 2021). Respondents tend to answer a single-item measure by considering only the aspects that are relevant to their situation (Fuchs & Diamantopoulos, 2009).

### **Subjective Financial Knowledge**

We assess the participants' subjective financial knowledge by asking them to evaluate their own level of financial knowledge using a Likert scale ranging from 1 (lowest) to 10 (highest), with a higher score indicating a higher level of perceived financial knowledge. Since this measure is a one-item scale, no reliability data was available. Single-item measurements for financial satisfaction are used in many studies, including the National Financial Capability Study carried out every three years by the FINRA Foundation for Investor Education starting in 2009 (FINRA Foundation, 2021). Other researchers have used similar one-item indicators for measuring subjective financial knowledge (Lind et al., 2020).

### **Financial Self-Efficacy**

Lown (2011) states that a financial self-efficacy scale (FSES) will help educators understand their own confidence levels in their ability to exert control over motivation and financial behaviors. As noted above, it is understood that higher levels of efficacy will help teachers lead and stimulate their students to higher levels of achievement. The FSES developed by Lown consists of six items on a four-point Likert-type scale, with ratings from 1 (exactly true) to 4 (not at all true) for total scores ranging from six to 24. The six items in the Lown financial self-efficacy scale are: (a) When faced with a financial challenge, I have a hard time figuring out a solution; (b) It is hard to stick to my spending plan when unexpected expenses arise; (c) I lack confidence in the ability to manage my finances; (d) I worry about running out of money in retirement; (e) It is challenging to make progress toward my fi-

nancial goals; and (f) When unexpected expenses occur, I usually have to use credit.

To test the validity and determine the reliability of the FSSES, we perform a PCA to identify and determine a composite score for financial self-efficacy. We calculate a KMO index to analyze whether factor analysis is appropriate for our data. We estimate Cronbach's alpha to measure internal consistency or how closely related the scale items are.

### **Financial Behavior Score**

The survey included nine questions related to financial behaviors. We assigned point values to each answer: yes = 1 and no = 0. The questions were: (a) Do you have a list of monthly expenses or a monthly family budget?; (b) Do you take care of your financial needs (food, shelter, clothing, transportation) before spending on other items such as dining out or entertainment?; (c) Do you save some money every month in a savings or share account in a financial institution or credit union, respectively?; (d) Have you obtained a copy of your credit report within the last 12 months?; (e) Do you own a mutual fund, stock, or bond?; (f) Do you have auto and homeowner's (or renter's) insurance?; (g) Have you written down your financial goals for this year?; (h) Do you spend less than you earn each month?; and (i) Do you pay ATM fees when you use your debit card? We then added the answers to determine the participant's financial behavior score.

### **Financial Literacy Scale**

Financial literacy refers to skills and not specifically objective financial knowledge (Fernandes et al., 2014). De Moor and Verschete (2017) asserted that financial literacy comprises "proper knowledge, attitudes and behaviors" (p. 318). In our study, we include three factors (total financial self-efficacy, total financial behavior, and subjective financial knowledge) to create a scale to measure the respondents' financial literacy level. The financial self-efficacy score is the sum of the responses obtained from the participants, which ranges from six to 24. The financial behavior

score is the sum of the responses, where yes = one and no = zero, and ranges from zero to nine. The level of financial knowledge indicated by each participant is the score we use for subjective financial knowledge, which ranges from zero to ten. To determine the reliability and test the validity of the financial literacy scale, we perform a PCA to identify and determine a composite score for financial literacy. We calculate a KMO index to analyze whether factor analysis is appropriate for our data. We estimate Cronbach's alpha to measure how closely related the three scale items are.

### **Determinants of Financial Behavior**

Financial behaviors are an important financial literacy component, as behaviors reflect short-term decision-making (Fernandes et al., 2014). The financial behavior score for each participant is the sum of the responses, ranging from zero to nine. We perform an OLS regression analysis to identify possible determinants of financial behaviors among the participants. The dependent variable is the financial behavior score, and the independent variables include financial self-efficacy, subjective financial knowledge, financial satisfaction, net worth, existence of an emergency fund, gender, age, civil status, level of education and gross income. The p values for each of these 10 coefficients tell us whether the relationships are statistically significant predictors of financial behaviors.

## **Results and Discussion**

### **Socioeconomic and Demographic Variables**

Table 1 describes the respondents based on their demographic attributes. The gender distribution consisted primarily of women (90%). The average age of the respondents was 45 years (Standard Deviation = 8.7), slightly less than half (44%) were married, and 84% owned their own homes. Slightly more than half (53%) have pursued graduate-level education. Although the gross household income fluctuated between \$20,000 or less to over \$100,000,

85.2% of the participants earned \$50,000 or less. A significant majority (87%) of Puerto Rico's municipalities were represented in the training program. Only 39 of the 447 respondents (8.7%) have taken a course in personal finance, and only 16 of 446 respondents (3.5%) have taught a personal finance course.

Table 1

<i>Demographic Profile</i>			
Description and responses received	N	Mean	SD
Gender	454	.92	.56
Male = 0 (45)			
Female = 1 (409)			
Age	389	45.00	8.7
Marital Status	454	2.4	1.712
Married = 1 (202)			
Single, Separated, living with someone, not married = 0 (252)			
Level of Education	454	3.21	.96
High School Diploma, associate degree, Bachelor's Degree = 0 (202)			
Some Graduate School, Master's Degree, Ph.D., Other = 1 (252)			
Home Ownership	450	1.24	.59
Yes = 1 (377)			
Rent, Live in a home that is not yours and you pay no rent = 0 (73)			
Household Gross Income	445	2.55	.87
Less than \$20,000 = 1 (20)			
\$20,001 to \$35,000 = 2 (239)			
\$35,001 to \$50,000 = 3 (120)			
\$50,001 to \$75,000 = 4 (54)			
\$75,001 to \$100,000 = 5 (11)			
More than \$100,000 = 6 (1)			
Teach a financial education course	446	.83	.37
Yes = 1 (16)			
No = 0 (430)			
Taken Course in Personal Finance	447	.09	.28
No = 0 (408)			
Yes = 1 (39)			

## Overall Financial Knowledge

The responses from the 267 participants whose pre and post-tests were matched through the assigned codes were analyzed via a paired-sample t-test to measure the change in financial knowledge and determine whether the observed change is significant. We observed a significant improvement in the level of financial knowledge after taking the personal finance workshops and participating in the group discussions. The average pre-test score was 66%, and the post-test average was 71%. On average, the participants obtained a significantly higher grade on the post-test ( $M = 71.23$ ,  $S.E. = 0.009$ ) than on the pre-test ( $M = 65.89$ ,  $S.E. = 0.007$ ,  $t(266) = -5.222$ ,  $p < .05$ ,  $r = .30$ ). Although the improvements in objective financial knowledge were statistically significant, the size effect, or standardized measure of the observed effect, ( $r = .30$ ) is considered medium because it explains 9% of the variance (Field, 2005). An observed effect of  $r = .10$  is considered small because it explains 1% of the total variance. An observed effect of  $r = 0.50$  is considered a large effect since it explains 25% of the variance.

We note the level of subject matter proficiency may still be considered below what teachers would be expected to achieve. The average overall subjective knowledge score of 71% is below the 80% grade expected from teachers when considering subjective knowledge on content specialty (Washington Educator Skills Test, 2023).

## Financial Knowledge by Module

Table 2 presents the data collected from the participants whose pre and post-tests were matched through the assigned codes and analyzed via a paired-sample t-test for each financial knowledge module. We found that objective financial knowledge improved over the three weeks of the training program in each of the six topic areas covered in the modules. For example, on average, the participants obtained a significantly higher grade for the financial responsibility module on the post-test ( $M = 13.49$ ,  $S.E. = 0.101$ ) than on the pre-test ( $M = 11.30$ ,  $S.E. = 0.128$ ,  $t(255) = -16.46$ ,  $p < .000$ ,  $r = .72$ ). The effect size (.72) is considered large

Table 2

*Financial Knowledge Change by Module Topic, Paired Sample t-tests*

Module <sup>1</sup>	Max <sup>2</sup>	N <sup>3</sup>	Post % <sup>4</sup>	Post (S.E.) <sup>5</sup>	Pre (S.E.) <sup>6</sup>	Pre % <sup>7</sup>	t (df) <sup>8</sup>	p < <sup>9</sup>	r <sup>10</sup>
Financial responsibility	17	256	79%	13.49 (.10070)	11.30 (.12792)	66%	-16.460 (255)	.000	.72
Economic concepts	11	258	66%	7.28 (.08131)	5.79 (.11486)	53%	-12.597 (257)	.000	.62
Income, expenses, savings, and investments	11	257	69%	7.55 (.07013)	6.54 (.07036)	59%	-11.424 (256)	.000	.58
Credit, debts and forms of payment	10	257	71%	7.0739 (.07909)	4.28 (.10817)	43%	-26.306 (256)	.000	.85
Short- and long-term goal setting	6	258	62%	3.67 (.06621)	3.08 (.07868)	51%	-7.030 (257)	.000	.40
Budgeting and financial management	20	257	80%	16.05 (.12761)	12.57 (.16600)	63%	-20.141 (256)	.000	.78

*Note.* This table reports the improvements in test scores measured by post and pre-test results and if the changes are statistically significant. <sup>1</sup>Module topic. <sup>2</sup>The number of questions by module topic. <sup>3</sup>Number of respondents. <sup>4</sup>Percent of correct responses on the post-test. <sup>5</sup>Average correct responses on the post test for the module topic. S.E. is the standard error of the mean. <sup>6</sup>Average correct responses on the pre-test for the module topic. S.E. is the standard error of the mean. <sup>7</sup>Percent of correct responses on the pre-test. <sup>8</sup>The test statistic the with (df) degrees of freedom or sample size minus 1. <sup>9</sup>Confidence interval of the mean difference between pre and post-test scores. <sup>10</sup>r<sup>2</sup> is the effect size of statistical significance of t.

and represents a significant finding. The budgeting and financial management module also shows a statistically significant improvement from the pre-test to the post-test. On average, the participants obtained a significantly higher grade on the post-test ( $M = 16.05$ ,  $S.E. = 0.128$ ) than on the pre-test ( $M = 12.57$ ,  $S.E. = 0.166$ ,  $t(256) = -20.14$ ,  $p < .000$ ,  $r = .78$ ). The effect size (.78) is considered large and represents a significant finding. We also observed that only financial responsibility (79%) and budgeting and financial management (80%) were on or just below the 80% threshold. The post-test results for the four modules covering (a) economic concepts, (b) income, expenses, savings, and investments, (c) credit, debts, and forms of payments, and (d) short- and long-term goal setting indicate teachers need to improve their knowledge in these content areas. As shown in Table 2, the improvements from pre to post-test scores were statistically significant for each of these modules, and the effect sizes were large for all but the short- and long-term goal setting, which was observed to have a medium effect size.

### **Financial Behaviors**

Financial behaviors reflect a person's financial capability. Teachers who exhibit the positive behaviors they are attempting to instill in their students can share their personal experiences with their students as part of the teaching methodology. Financial behaviors are a good example of implementing the financial topics being taught. In our study, we developed a financial behavior score based on the answers provided by the participants to a series of nine questions. The responses were added to establish the respondents' total scores. The total scores ranged from zero to nine ( $n = 406$ ), with an average score of 4.87 ( $SD = 1.98$ ). The average score of financial behaviors, 4.87 ( $SD = 1.98$ ), was below the results obtained by other researchers. Schindler (2014) observed an average score of 5.78 ( $SD = 1.83$ ) for a group of 316 high school teachers.

### Financial Self-efficacy

The financial self-efficacy scale for this group of participants contained only one factor, accounting for 47.22% of the variance in the responses. The factor loadings for each response are shown in Table 3. Total scores ranged from six to 23, with a mean score of 13.25 (SD=3.67). The internal consistency (reliability) of the scale is strong as measured by Cronbach's alpha ( $\alpha = .78$ ). The measurement sampling adequacy, the KMO index, is calculated to be .78 and is considered good (Nunes et al., 2020).

Table 3

*Factor Analysis of Financial Self-Efficacy Scale*

Item	Factor
When faced with a financial challenge, I have a hard time figuring out a solution.	.754
It is hard to stick to my spending plan when unexpected expenses arise.	.731
I lack confidence in the ability to manage my finances.	.698
I worry about running out of money in retirement.	.672
It is challenging to make progress toward my financial goals.	.633
When unexpected expenses occur, I usually have to use credit.	.624

In our study, we translated the financial self-efficacy questions developed by Lown (2011). We consider the translation of the questions to be adequate since the reliability observed from this data ( $\alpha = .78$ ) was similar to results obtained by Lown with  $\alpha = .76$ , and by Schindler (2014) with  $\alpha = .78$ . The use of this scale is not limited to only English-speaking populations, thus widening the potential use of the scale.

### Subjective Financial Knowledge

The participants reported their level of subjective financial knowledge on a ten-point Likert scale ranging from one (lowest) to ten (highest). Scores ranged from one to ten, with an average subjective financial knowledge score of 4.25 (SD = 2.36),

or 42.5%. The average pre-test score on the objective financial knowledge was 65%. This differs from previous researchers, as people tend to overestimate their levels of financial knowledge (Bialowas, 2017; Robb & Woodyard, 2011).

### **Financial Literacy Scale**

In our study, we developed a financial literacy scale, as described by De Moor and Verschetze (2017) and De Beckker et al. (2019). The three items included in the scale were subjective financial knowledge, financial self-efficacy and financial behaviors, entail an opinion, a belief and an action. Other researchers (Xiao & O'Neill, 2016) have used the term financial capability; one has the knowledge, the confidence to carry out the action and expects to influence the outcome, and one takes action. The average financial literacy score of 22.08 (of a possible total of 40) reflects a low level of overall financial literacy, with each item showing similar results (subjective financial knowledge 4.25/10, financial self-efficacy 13.25/23, and financial behaviors 4.87/9.0).

Financial literacy considers the combination of financial self-efficacy, financial behaviors, and subjective financial knowledge. The loading for the financial behaviors factor was .813, the loading for the financial self-efficacy factor was .799, and the loading for the financial knowledge factor was .790. The financial literacy scale contained only one factor which could not be rotated. This factor accounted for 64.15% of the variance in the responses. The scale's reliability is strong as measured by Cronbach's alpha ( $\alpha = .72$ ). This is within generally accepted parameters for scales, even considering it includes three items (Webb, 2011). The measurement sampling adequacy, the KMO index, is calculated to be .68.

Being financially literate is more than being knowledgeable; it also requires acting through short-term decisions. We found the financial literacy score to be positively correlated with higher levels of net worth ( $r(429) = .296, p < .001$ ), having received personal finance training ( $r(444) = .124, p < .010$ ), and teaching personal finance in class ( $r(439) = .148, p < .002$ ).

## Determinants of Financial Behaviors

Financial behaviors reflect how individuals act when making short and long-term financial decisions. Table 4 presents the results of the ordinary least squares (OLS) regression analysis performed in our study to analyze the determinants of the financial behaviors among the participants.

Table 4

*Ordinary Least Squares regression analysis: Determinants of financial behaviors*

Model variables	B	S.E. B	$\beta$
(Constant)	.991	.764	
Financial self-efficacy	.164***	.034	.307
Subjective financial knowledge	.196***	.056	.240
Financial satisfaction	.102**	.050	.133
Net Worth	-.012	.069	-.010
Having an emergency fund	.006	.008	.042
Male	.059	.140	.021
Age	.007	.011	.031
Being married	-.019	.058	-.017
Education level	.032	.106	.016
Gross income	.012	.119	.005

*Note.* Adjusted R squared: .306. \*\*\*  $p < .001$ , \*\*  $p < .05$ .

Dependent variable is the financial behavior score that runs from zero to nine.

The model included variables for financial self-efficacy, financial satisfaction, subjective financial knowledge, net worth, having an emergency fund, gender (male), age, civil status (being married), education level, and income level. As previously stated, the score consists of the answers to nine questions, and each positive answer is worth one point. A higher score suggests more positive financial behaviors. The results of the OLS regression analysis indicated three predictors (financial self-efficacy, subjective financial knowledge, and financial satisfaction) explained 31.4% of the variations of financial behaviors ( $F(10, 260) = 13.387, p < .001$ ). The results were significant at the  $p < .001$  level. The  $R^2$  value of 31.4% suggests there is a wide range of variability around the re-

gression line, even with three statistically significant independent variables. We observed that financial self-efficacy significantly predicted a higher level of financial behaviors ( $B = .164$ ,  $p < .001$ ), subjective financial knowledge significantly predicted a higher level of financial behaviors ( $B = .198$ ,  $p < .001$ ), and financial satisfaction predicted a higher level of financial behaviors ( $B = .102$ ,  $p < .045$ ).

Tang et al. (2015) suggested that financial knowledge is not the only significant driver of financial behaviors, although the type of financial knowledge, subjective or objective, was not specified. Other researchers have suggested that efficacy and other psychological factors may play a vital role in determining financial behaviors (Lown, 2011; Topa et al., 2018). This study seems to support that perspective since the two variables identified as explanatory of financial behaviors are how respondents view their own level of financial knowledge and how they can affect the outcomes of financial decisions (financial self-efficacy), both psychological in nature.

### **Conclusions and Implications**

Our objective of this paper was to analyze the level of financial knowledge possessed by teachers in Puerto Rico and how other factors such as financial self-efficacy, and the relationships between socioeconomic and demographic variables, impact their financial behaviors. The results show evidence that the current level of financial knowledge among these educators is below the expected level for someone responsible for teaching these topics. Although they show improvements after the training program, continued education might help develop the necessary skills and knowledge to teach this subject.

Our second research question was how we could improve the financial knowledge educators possess. The results show an improvement in objective financial knowledge due to the training program. Although this study did not consider the duration of the increased objective financial knowledge, it is hoped that these

results will sustain teacher performance. Compen et al. (2019) noted that training sessions lasting at least 14 hours have shown a sustained impact on teacher performance. The program in our study lasted 31 hours. Continuing professional education courses should be made part of the educator training programs.

The results obtained from this research can be used to create education and training materials for financial educators. These materials may be used to measure and increase subjective financial knowledge, develop positive financial behaviors, and increase financial self-efficacy. Blazer and Kraft (2017) observed that financial educator behaviors help develop student attitudes and behaviors under the content-specific view of education. We posit that increased personal finance content will carry over to educators' private lives and enhance their financial wellbeing.

Our third research question addressed how we can measure the financial literacy of educators. The results of the translation into Spanish of the financial self-efficacy scale (Lown, 2011) suggest that the use of this scale is not limited to English-speaking populations, thus widening the potential use of the scale. The development of the financial literacy index provides researchers with an additional tool to use in future research regarding the capabilities of financial educators and financial consumers.

Our fourth research question considered how we can investigate (or document) the potential determinants of the financial behaviors of educators. The results from this study may contribute to the development of assessment tools related to the teaching of financial education. Effective teaching incorporates financial knowledge and financial self-efficacy. Modeling, as defined in this study as financial behaviors, is also considered an important aspect of effective teaching (Blazar & Kraft, 2017).

### **Research Limitations**

This study presents several limitations, most related to its design. Other factors may affect the interpretation of the results, such as the location of the respondents, choice of measures,

length of the questionnaire, length of the training program, and the choice of instructional techniques. We obtained the data in our study from questionnaires (the pre-tests and post-tests) completed voluntarily (self-selection bias). The topics were selected based on the financial education standards established by the Departamento de Educación de Puerto Rico (Puerto Rico Department of Education, 2022) which include savings, investment, consumer behavior, global and local economics, budgeting, and resource management. The participants were limited to teachers of grades four to six.

The duration of the training program was three weeks and no subsequent follow-up tests were conducted. While we found the increase in financial knowledge to be positive, researchers have indicated that financial knowledge and decision-making skills deteriorate over time (Fernandes et al., 2014). Future studies should include tests to measure the level of financial knowledge impairment.

The results should be interpreted concerning the population of interest in this study. Replication studies might be required to confirm the validity of our findings. The respondents were limited to Social Studies and Mathematics teachers of grades 4 to 6 from the public-school system in Puerto Rico, 90% of whom were women, representing a possible gender bias. In addition, respondents from different geographical areas, grades, and different education systems may produce different results. Notwithstanding these limitations, the results obtained in this study can be used in future research regarding educator preparation to teach personal finance.

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