Teacher Preparation and Student Achievement in Personal Finance: Evidence from *Keys to Financial Success*

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INTRODUCTION

Over the past decade, there has been increased attention on the need to include personal finance in the high school curriculum. This perceived need has been fueled by articles from the popular press, statistics on the impact of poor financial decisions made by young adults, and articles from the academic community. In addition, the call for financial education has been reinforced by former Federal Reserve Chairman Alan Greenspan (2001) and current Chairman Ben Bernanke (2006). While there has been a growing interest in offering personal finance education in the K-12 classroom and increasing interest in measuring the effectiveness of personal finance education programs, there is limited evidence of the effect of teacher professional development programs and teacher characteristics on student achievement in personal finance. This paper explains the features of a high school personal finance curriculum – "Keys to Financial Success," which is offered by a consortium of partners in Delaware, New Jersey, and Pennsylvania – and the results from a multiyear study of pre- and posttest scores from students in classrooms with teachers who use the "Keys" materials. In this paper, we report on our examination of the effect of teachers on their students' personal finance achievement in *Keys* classrooms.

LITERATURE

Financial Education

The literature regarding financial education programs has focused on how programs can impact both student achievement and student attitudes. Financial education programs at the high school level have proven popular. However, only a few studies exist that specifically examine high school personal finance courses and their effects on student achievement. These studies focused on how certain aspects such as gender and the curricula used impact student achievement (Butters, Asarta and McCoy, 2012; Fox et al., 2005; Harter and Harter, 2009; Hathaway and Khatiwada, 2008; Mandell, 2008; McCormick, 2009; Walstad, Rebeck, and McDonald, 2012). More specifically, Butters, Asarta and McCoy (2012) used data from the National Personal Finance Challenge in 2011 to conclude that male students outscore female

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students on a test of financial knowledge. Fox et al. (2005) evaluated many programs and determined the need for more stable curricula in financial education as well as effective programs to increase financial knowledge. Harter and Harter (2009) also found that 10th grade students who took a financial education course benefited in terms of student achievement. Walstad, Rebeck, and McDonald (2012) determined that the *Financing Your Future (FYF)* curriculum increased student personal finance achievement. Overall, well-constructed studies of specific personal finance programs have found positive effects of those programs on student achievement.

Research on the effect of school-based personal finance programs on student behaviors and attitudes is mixed, thus suggesting that retention and application of financial knowledge resulting from personal finance education programs needs further examination. Bernheim et al. (2001) found a positive relationship between financial education mandates in high school and adult financial behavior, specifically increased savings rates as well as increased earnings. Varcoe et al. (2005) found positive results when looking at high school personal finance courses and subsequent financial behaviors in California.

However, not all studies find long-run positive effects of high school personal finance programs. For example, Tennyson and Nguyen (2001) used data from the Jump$tart survey and found very little difference in financial knowledge between those students who had taken a mandated personal finance course in high school and those who did not. Mandel and Klein's (2007) study concluded that students who had personal finance courses in high school still did not have much more increased financial knowledge, citing lack of motivation and knowledge retention as the primary causes. Peng et al. (2007) found that across high school personal finance courses, there was no significant relationship between taking the course and gaining personal finance knowledge after the fact. However, as explained by Fox et al. (2005) and Walstad, Rebeck, and MacDonald (2010), many of these studies did not use the strongest research methodologies. Overall, research into the long-run effects of school-based personal finance courses remains nascent.

Research in economic education has shown that economics teachers do have a positive impact on their students' performance and economics knowledge. For example, Bosshardt & Watts (1990) showed that high quality, well-trained teachers have positive effects on student achievement in high school economics courses. The same two authors subsequently showed that this positive effect was also present at the college level in introductory economics courses (Bosshardt & Watts 1991). A number of other studies have looked at teacher effects in economic education (Becker, Greene and Rosen, 1990**;** Lopus, 1990**;** Allgood and Walstad, 1999). Given the ongoing importance of in-service teacher training in the field, research into teacher effects on student achievement in economics remains important.

To date, only two studies examine teacher effects within the context of financial education programs at the high school level. Harter and Harter (2009) found that the *Financial Fitness for Life (FFFL)* curriculum was effective in increasing students' financial knowledge at the 10th grade level. Furthermore, they showed that that teachers trained to teach personal finance using the *FFFL* curriculum had students who exhibited greater increases in student achievement than those students whose teachers were untrained in the use of the *FFFL* curriculum. Walstad, Rebeck, and MacDonald (2010) used a fixed effects model to examine teacher effects on student achievement using the *FYF* curriculum. They found no evidence of teacher effects on student achievement in their sample. Given the very limited number of studies that have examined teacher effects on student achievement in personal finance, this topic remains an important, relatively untapped area for research. This paper attempts to add to the existing literature by examining teacher effects on student achievement in a specific, high school personal finance program.

Given the ongoing interest in training teachers to better teach personal finance and the very limited or nonexistent pre-service preparation that most teachers have received in teaching economics or personal finance, research into the effectiveness of the training programs is important. Do the myriad of teacher training programs work? Do they matter? Many professional development programs concentrate

on preparing teachers to teach specific academic content, which in turn they are expected to teach their students. A number of studies have shown positive effects of professional development programs in economic education on teacher knowledge (Weaver, Deaton and Reach, 1987; Swinton et. al., 2007; Swinton, Scafidi and Woodard, 2012). A few studies have also shown that having a teacher who attended an economic education professional development workshop in positively impacts student achievement in economics (Swinton et. al., 2007; Swinton, Scafidi and Woodard, 2012).

THE KEYS TO FINANCIAL SUCCESS PROGRAM

In the spring of 2001, the University of Delaware Center for Economic Education and Entrepreneurship (Center), the Federal Reserve Bank of Philadelphia, the Delaware Bankers Association, and the Consumer Credit Counseling Service of Maryland and Delaware formed a partnership to provide curriculum resources and teacher training to Delaware high schools interested in teaching a semester personal finance course. Work commenced in the late spring and early summer of 2001 to compile a 90-day instruction plan for a high school personal finance course that would make use of existing curriculum resources, approach the teaching of personal finance using materials grounded in the economic way of thinking, and allow the course to be flexible enough to be taught by teachers in the social studies, family and consumer science, mathematics, and business departments. The resulting course plan, called *Keys to Financial Success*, makes extensive use of lessons from the Council on Economic Education's widely distributed *FFFL* (Morton and Schug, 2001) and *Learning, Earning, and Investing* (LEI) (Caldwell et al., 2004) lesson books. These lessons make use of active and collaborative learning and are engaging for the students. Since these two packages did not include lessons on specific topics of importance to the partners, such as risk management, goal setting, and career planning, lessons were developed by the staff at the Center and the Federal Reserve Bank of Philadelphia or were taken from VISA's *Practical Money Skills* (2000). To motivate students and add relevance to the course, students are asked in the first two units to research different careers and set personal and financial goals. Based on their research and goals, the students, with guidance from the teacher, select a career for use during the course. The students'

goals and careers with entry-level wages are revisited throughout the remaining units in the course. Students are asked to apply what they have learned using the income associated with their selected career and determine how their decisions impact their goals. The intent of this approach is to help students see the relevance of being financially literate both now and as adults.

The *Keys* course consists of 52 lessons built around nine themes: goals and decision-making, careers and planning, budgeting, saving and investing, credit, banking services, transportation issues, housing issues, and risk protection. Throughout the course, students use the Internet for access to the latest information on personal finance topics and financial products. This approach allows teachers to update lessons from year to year to reflect changes in the financial marketplace. Using knowledge gained from the lessons and information gleaned from the Internet, students create a personal portfolio of tools and data. The students are encouraged to keep their portfolios as a reference when making financial decisions after high school.

Participating schools commit to offering the course at least once per academic year. Teachers attend a week-long training course at the Federal Reserve Bank of Philadelphia taught by individuals from the Center and the Federal Reserve Bank of Philadelphia. These economic educators have advanced degrees in economics or economic education as well as extensive experience in teaching classes for teachers.

DATA

From the inception of the *Keys to Financial Success* program, the partners recognized the importance of measuring the impact of the course on the personal finance achievement of the students. A 50-question personal finance test was developed based on the 50-item high school multiple-choice test (*FFFL-HS* Test) published by the Council for Economic Education to accompany the *Financial Fitness for Life* personal finance curriculum. This test, which contains good internal consistency and measures financial literacy with accuracy, covers most of the national personal finance standards developed by the

Jump$tart Coalition. Additionally use of this instrument is well suited for measuring the effectiveness of the *Keys* course since *Keys* makes use of all but two lessons from the *FFFL* curriculum. In order be able to test students on the content not covered in the *FFFL* curriculum but included in the *Keys* curriculum, the authors independently developed four multiple-choice questions. *FFFL-HS* test questions 12, 13, 16, and 49 were omitted from the resulting *Keys* test instrument and replaced with these "in-house" questions.

Data in this study were collected by 17 teachers teaching personal finance courses based on the *Keys to Financial Success* course model during the 2011-2012 and 2012-2013 school years. Teachers were provided with pre- and post-test instruments. They administered the tests at the beginning and the end of their courses. The students self-identify their gender and age on the test instrument.

The students' pre- and post-test score information was merged with information about the *Keys* teachers. The *Keys* teacher information includes each teacher's gender, years teaching, years teaching the *Keys* course, subject area certification, and whether they have a master's degree. During the one-week professional development program offered to all new *Keys* teachers, they are pre- and post-tested using the same test instrument as their students.

[Table 1 about here]

Descriptive statistics for the unrestricted sample are presented in Table 1. A total of 917 students, taught by 17 teachers participated in the assessment reported in this study. The mean student pretest score was 20.79 questions correct. The mean student posttest score was 33.20 questions correct. This 12.41 question increase represents a nearly 60 percent increase in personal achievement for the average student in the study.[3] Females represented 53 percent of the students in the sample. Schools are split on when to offer the *Keys* program. Some offer it to juniors and seniors and others offer it to freshman and sophomores. The course is, however, most often offered as an elective and it is open to all students across the high school grades. Therefore, students were asked to self-report their age rather than their high

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[3] See Asarta, Hill, and Meszaros (2013) for a detailed analysis of the effectiveness of the *Keys* program using the same dataset.

school grade. Thirty-eight percent of the students were 15 years of age or younger at the time of the pretest.

Given the availability of detailed information about the students' teachers' experience, certification, and gender, the dataset used in this study allows us to investigate the potential effects of these teacher characteristics on student achievement in personal finance. Thirty-five percent of the teachers in this study were certified to teach business. Those teachers taught 40 percent of the students represented in the unrestricted sample. Another 18 percent of the teachers represented were certified to teach family and consumer science and those teachers taught 33 percent of the students in the sample. Fifty-nine percent of the teachers represented in the unrestricted sample had earned their master's degree. These teachers taught 64 percent of the students in the sample. The average tenure of the 17 teachers in the sample was 16.45 years. These teachers, on average, had been teaching the *Keys* course for 2.59 years. Seventy-six percent of the teachers in the sample were female and they taught 82 percent of the students.

[Table 2 about here]

While teacher pre- and posttest scores were available for most of the teachers in the study, three teachers in the unrestricted sample were trained before the use of the student's test instrument in measuring the teacher's personal finance knowledge at the beginning and end of the week-long professional development program. Teachers without pre- and posttest scores were excluded to create the restricted sample. Descriptive statistics for the restricted sample are presented in Table 2. The teachers in the restricted sample have fewer years of experience teaching the *Keys* program. The average teacher pretest score was 37.29 questions correct. The average teacher posttest score was 37.71 questions correct. These results indicate that there is very little growth in teacher knowledge of personal finance as a result of the one-week professional development program.

RESULTS

Two models were estimated to investigate the effects of teacher characteristics on student achievement using the unrestricted sample. Model 1 was an educational production function, estimated using OLS, with student posttest score as the dependent variable. The independent variables included the student pretest score, dummy variables for student age group, a dummy variable (*FemaleStudent*) that took the value 1 if the student was female, dummy variables for teacher certification area, a dummy variable (*Ed_Masters*) that took the value 1 if the student's teacher had a master's degree, the teacher's overall years of experience and years of experience teaching *Keys*, and a dummy variable (*FemaleTeacher*) that took the value 1 if the student's teacher was female.

[Table 3 about here]

As expected, *PreScore* was positive and highly statistically significant for all models estimated in this study. The four dummy variables for age were also highly statistically significant and the estimated coefficients were positive. The coefficients on these age dummy variables (the excluded group were students 19 and older) indicate that students older than 19 years of age performed significantly worse than their younger counterparts and younger students overall did better than older students. We found no effect of students' gender on their personal finance achievement, but we did find a positive, statistically significant effect of female teachers on student achievement. The only teacher certification variable that was statistically significant was *Certified_FCS*. The estimated coefficient on this variable implies that students in the sample whose teacher was certified to teach family and consumer sciences could be expected, on average, to have posttest scores that were 4.10 questions higher than their counterparts whose teachers were not certified in FCS. Likewise students whose teachers had master's degrees could, on average, be expected to have posttest scores that were 2.72 questions higher than their counterparts whose teachers had only bachelor's degrees. And, as expected, students whose teachers had more years of experience teaching their personal finance course based on the *Keys* model could be expected to have

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posttest scores that were, on average, 1.21 questions higher for each additional year of teacher experience with *Keys*.

Throughout the education literature there is evidence that the interactions between the student's gender and the teacher's gender may be one of the relevant factors in determining student achievement. In other words, students of one gender may be more likely to exhibit higher achievement gains if they are in a classroom taught by a teacher of the same gender or vice versa. To test this hypothesis, we constructed four dummy variables, one for each potential interaction (*MaleStudent-MaleTeacher, MaleStudent-FemaleTeacher, FemaleStudent-MaleTeacher, and FemaleStudent-FemaleTeacher*.) We estimated Model 2, which was an educational production function similar to Model 1 but with the gender interaction dummy variables substituting for *FemaleStudent* and *FemaleTeacher* (the omitted interaction variable was *FemaleStudent-FemaleTeacher*.) We found similar results between Models 1 and 2. The *Male-Male* and *Female-Male* interaction dummy variables were highly statistically significant with negative estimated coefficients and the *Male-Female* interaction variable was statistically insignificant. These results imply that in this sample there is a negative effect of having a male teacher (or positive effect of having a female teacher), but there is no interaction present between the genders of the students and the teachers.

[Table 4 about here]

Models 1 and 2 were reestimated for the restricted sample but with the inclusion of the teacher pre- or posttest score. The results from these regressions are reported in Table 4. Models 1A and 2A included the teacher's pretest score (*PreScoreTeacher*), while Models 1B and 2B included the teacher's posttest score (*PostScoreTeacher.*) With the inclusion of the teacher test scores, none of the student age dummy variables were statistically significant in the "A" models. Only the *Age18* dummy variable was statistically significant in the "B" models implying that the students who were 18 at the time of the pretest could be expected to score higher than the students who were older or younger. *Certified_FCS* remained

highly statistically significant across the models estimated on the restricted sample. *Certified_SS* was highly statistically significant and positive for the models estimated using *PostScoreTeacher* (B Models), but not for those models estimated using *PreScoreTeacher*. As expected, the teacher test score, whether pre- or posttest, was highly statistically significant across all four models estimated for the restricted sample implying that a student who has a teacher who scores one question higher on the pretest could be expected to score about 0.34 questions higher on the posttest or 0.27 questions higher for the models that used the teacher's posttest score. While *Ed_Masters* was highly statistically significant and positive for the models estimated using the unrestricted sample, it was insignificant in the models estimated for the restricted sample.

LIMITATIONS AND NEXT STEPS

While this study gives us some evidence of teacher effects on student achievement in personal finance, a number of questions remain. The relatively small number of teachers in the study limits the ability to draw far reaching conclusions from our results. For instance, are teachers certified in family and consumer sciences better at teaching personal finance than their counterparts certified in other disciplines or are there unobserved characteristics of the three FCS teachers in our study which are correlated with their certification and therefore positively and significantly impact student achievement in personal finance? The standard fixed-effects approach to accounting for these unobserved characteristics is not possible given both the limited number of teachers in the sample.

We possess additional pre- and posttest data from additional academic years. Moreover, we continue to collect pre- and posttest results from students currently taking *Keys* courses. While in this study we only looked at pre- and posttest results from semester personal finance courses, we also have additional data for year-long personal finances which can be added to the dataset and therefore increase the number of students and teachers in both the unrestricted and restricted samples. Future work will seek to increase the sizes of both the restricted and unrestricted samples.

CONCLUSIONS

The objective of this study was to investigate the relationship between teacher characteristics and student achievement in a high school personal finance course. The results from models estimated using pre- and posttest data collected from students who have taken a semester *Keys* course from a teacher trained to teach *Keys* show that students whose teachers were certified in family and consumer sciences score over four questions higher on their posttest than their counterparts taught by teachers certified in other disciplines. Students whose teachers had more years of experience teaching *Keys* and those whose teachers exhibited greater understanding of personal finance could also be expected to exhibit greater gains in their personal finance achievement.

Given the few opportunities afforded researchers to collect both pre- and posttest student data from semester-long personal finance courses and pre- and posttest data from the teachers teaching personal finance to those same students, our results provide additional evidence that a well-designed personal finance curriculum, properly implemented by trained teachers, can have a positive effect on student achievement. And, furthermore, our results show that teacher characteristics matter in determining student achievement in personal finance.

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Table 1: Descriptive Statistics for Unrestricted Sample
(Students N=917; Teachers N=17)

Variable	Mean	n
Test Scores		
PreScore	20.79	917
PostScore	33.20	917
Student Gender		
Female	0.53	489
Male	0.47	428
Student Age		
≤ 15 years	0.38	350
16 years	0.22	204
17 years	0.22	204
18 years	0.16	144
≥ 19 years	0.02	15
Teacher Characteristics (number of students)		
Certified_Business	0.40	371
Certified_FCS	0.33	307
Certified_SS	0.15	137
Certified_Math	0.11	102
Ed_Masters	0.64	587
YrsTeaching	17.48	917
YrsTeachingKeys	3.27	917
Female Teacher	0.82	752
Male Teacher	0.18	165
Teacher Characteristics (number of teachers)		
Certified_Business	0.35	6
Certified_FCS	0.18	3
Certified_SS	0.24	4
Certified_Math	0.24	4
Ed_Masters	0.59	10
YrsTeaching	16.45	17
YrsTeachingKeys	2.59	17
Female Teacher	0.76	13
Male Teacher	0.24	4
Gender Interaction Variables		
MaleStudent-Male Teacher	0.08	69
MaleStudent-Female Teacher	0.39	359
Female Student-Male Teacher	0.43	393
Female Student-Female Teacher	0.10	96

Table 2: Descriptive Statistics for Restricted Sample
(Students N=522; Teachers N=14)

Variable	Mean	n
Test Scores		
PreScore	20.49	522
PostScore	30.56	522
Student Gender		
Female	0.54	282
Male	0.46	240
Student Age		
≤ 15 years	0.43	222
16 years	0.24	123
17 years	0.19	98
18 years	0.13	70
≥ 19 years	0.02	9
Teacher Characteristics (number of students)		
Certified_Business	0.33	171
Certified_FCS	0.29	153
Certified_SS	0.26	137
Certified_Math	0.12	61
Ed_Masters	0.66	342
YrsTeaching	12.74	522
YrsTeachingKeys	1.58	522
Female Teacher	0.76	398
Male Teacher	0.24	124
PreScoreTeacher	42.45	522
PostScoreTeacher	43.41	522
Teacher Characteristics (number of teachers)		
Certified_Business	0.29	4
Certified_FCS	0.14	2
Certified_SS	0.29	4
Certified_Math	0.29	4
Ed_Masters	0.57	8
YrsTeaching	15.57	14
YrsTeachingKeys	1.93	14
Female Teacher	0.71	10
Male Teacher	0.29	4
PreScoreTeacher	37.29	14
PostScoreTeacher	37.71	14
Gender Interaction Variables		
MaleStudent-Male Teacher	0.11	56
MaleStudent-Female Teacher	0.35	184
Female Student-Male Teacher	0.41	214
Female Student-Female Teacher	0.13	68

Table 3: Regression Results for Unrestricted Sample

Variable	Model 1 (n=917)	Model 2 (n=917)
Dependent Variable = Posttest Score		
Intercept	3.01	6.53
	(2.61)	2.63
PreScore	0.73**	0.73**
	(0.05)	(0.05)
Age15orYounger	6.48**	6.46**
	(2.09)	(2.09)
Age16	6.11**	6.09**
	(2.08)	(2.08)
Age17	6.01**	6.00**
	(2.03)	(2.03)
Age18	5.47**	5.45**
	(2.06)	(2.06)
FemaleStudent	0.63	
	(0.51)	
Certified_Business	0.78	0.76
	(1.03)	(1.03)
Certified_FCS	4.10**	4.08**
	(1.02)	(1.02)
Certified_SS	-1.88	-1.90
	(1.08)	(1.08)
Ed_Masters	2.72**	2.71**
	(0.78)	(0.78)
YrsTeaching	-0.04	-0.04
	(0.03)	(0.03)
YrsTeachingKeys	1.21**	1.21**
	(0.15)	(0.15)
FemaleTeacher	2.82**	
	(0.93)	
MaleStudent-MaleTeacher		-3.23**
		(1.20)
MaleStudent-FemaleTeacher		-0.73
		(0.56)
FemaleStudent-MaleTeacher		-3.06**
		(1.10)
Adjusted R^2	0.33	0.33
F	36.01**	33.42**

Note: Standard errors in parentheses
* $p <.05$; ** $p <.01$, two-tailed test.

TABLE 4: Regression Results for Restricted Sample

Variable	Model 1A (n=522)	Model 1B (n=522)	Model 2A (n=522)	Model 2B (n=522)
Dependent Variable = Posttest Score				
Intercept	-10.45	-2.97	-9.57	-0.38
	(6.38)	(4.19)	(6.12)	(3.68)
PreScore	0.78***	0.79***	0.78***	0.79***
	(0.06)	(0.06)	(0.06)	(0.06)
Age15orYounger	4.29	4.10	4.24	4.07
	(2.70)	(2.68)	(2.70)	(2.68)
Age16	4.41	4.38	4.39	4.37
	(2.70)	(2.68)	(2.70)	(2.68)
Age17	4.46	4.85	4.48	4.87
	(2.64)	(2.62)	(2.64)	(2.62)
Age18	4.68	5.23**	4.69	5.25**
	(2.67)	(2.65)	(2.67)	(2.65)
FemaleStudent	0.41	0.50		
	(0.67)	(0.67)		
Certified_Business	-0.55	-1.25	-0.52	-1.21
	(1.69)	(1.67)	(1.69)	(1.67)
Certified_FCS	4.69***	4.11***	4.69***	4.14***
	(2.00)	(1.88)	(2.00)	(1.88)
Certified_SS	-0.65	4.35***	-0.66	4.37***
	(1.59)	(2.11)	(1.59)	(2.11)
Ed_Masters	-1.15	0.01	-1.18	0.00
	(1.53)	(1.49)	(1.53)	(1.49)
YrsTeaching	0.09	-0.13	0.09	-0.12
	(0.08)	(0.10)	(0.08)	(0.10)
YrsTeachingKeys	2.50***	-0.64	2.56***	-0.63
	(0.89)	(0.82)	(0.89)	(0.82)
FemaleTeacher	0.64	2.06		
	(1.80)	(1.83)		
MaleStudent-MaleTeacher			-0.65	-2.19
			(2.03)	2.06
MaleStudent-FemaleTeacher			-0.75	-0.83
			(0.77)	0.77
FemaleStudent-MaleTeacher			-1.29	-2.7
			(1.94)	1.97
PreScoreTeacher	0.34***		0.35***	
	(0.12)		(0.12)	
PostScoreTeacher		0.27***		0.27***
		(0.07)		(0.07)
Adjusted R^2	0.30	0.31	0.29	0.31
F	16.59***	17.37***	15.53***	16.25***

Note: Standard errors in parentheses

* $p < .1$; ** $p < .05$; *** $p < .01$, two-tailed test.