Financial Literacy in the Community College Classroom: A Curriculum Intervention Study

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Abstract

We added a financial literacy curriculum unit to 62 of the 93 sections of Urban Community College's New Student Course; the other 31 sections of the course served as the control group. All students were given a pre and post-test on their knowledge of four dimensions of financial literacy. We found that student pre-test scores, academic ability, and participation in the financial literacy curriculum were statistically significant predictors of student post-test scores. On average and depending on the model used, students who received the financial literacy curriculum scored about 5 to 7 percentage points better than students who did not.

Key words: financial literacy, financial education, community college, hierarchical linear modeling

JEL: A22, G00

1. Introduction

Today's young adults are faced with increasingly complex financial decisions, and they often lack a basic understanding of financial terms and concepts, which inhibits their abilities to make sound financial choices for themselves and their families (Lusardi & Mitchell, 2014). Studies by Chen and Volpe (1998) and Shim et al. (2010) report a lack of financial literacy among college students in particular. The 2012 Financial Industry Regulatory Authority (FINRA) Foundation's National Capability Study provides information about the financial knowledge and behaviors of those 18 to 34 years old. The study found that this age group has lower scores on a test of financial literacy than those in older age groups and the lack of financial knowledge correlates with poor financial behaviors (FINRA, 2014).

Urban Community College (UCC) is the largest of a 16-college state community college system. As of fall 2013, enrollment across its six campuses (City Center, City South, Technology, County North, County South, and County East) was approximately 13,500 students. Concerned about rising student loan default rates and the perceived low financial literacy among its students, UCC sought out programming assistance from the Federal Reserve Bank of St. Louis (FRB). Together, the FRB and UCC envisioned several pathways to reach UCC's students with financial education, eventually deciding to use their New Student Course (NSC).[1] NSC is a 3-hour, letter-grade assigned, required course for all incoming students designed to promote success in the college environment. NSC covers topics such as goal setting, study habits, and choosing a major based heavily on Staley's textbook *Focus on Community College Success* (2014). UCC invited FRB to develop, implement, and study a financial literacy curriculum unit as part of the course, which is the focus of this paper.

[1] FRB also provides financial education programming to UCC's Single Parent Support Group and consultations services to UCC's Financial Literacy Committee, is a member of UCC's Student Loan Default Management Committee, and contributes articles to the school's Financial Literacy Newsletter.

The purpose of this study was to (i) establish the financial literacy levels of UCC's incoming new students and (ii) determine whether a financial literacy curriculum unit, as part of the NSC, could positively influence financial literacy. Thus, our research question is as follows:

1) What impact does a financial literacy curriculum unit, as part of the NSC course, have on student financial literacy?

We explore this question by first addressing a review of the relevant literature. Next, we present an overview of the methodology used in this study, including study design and econometric techniques. We then introduce two additional research questions that can be answered specifically by using hierarchal linear modeling. This is followed by the results of the study, and we conclude by addressing policy implications, potential limitations to our research, and ideas for further study.

2. Literature Review

2.1. General Financial Education/Financial Literacy

Numerous studies and surveys find that the level of financial literacy in the United States is quite low (Lusardi, Mitchell, Curto, 2010; Lusardi and Mitchell, 2009; and Mandell, 2008). Studies also show that personal finance education contributes to more informed financial decision-making. For example, Hilgert, Hogarth, and Beverly (2003) found a strong correlation between financial literacy and day-to-day money management skills. Carpena, Cole, Shapior, and Zia (2011) found that financial education increases awareness of financial products and tools and changes people's attitudes about those products and tools. Chan and Stevens (2008) found that knowledge of retirement incentives is related to informed decision-making about retirement savings choices. Further, Stevens found that misinformed people respond to their perceived, but incorrect, retirement information; that is, they make poor choices based on misinformation they believe to be correct. Other studies indicate that the more financially literate people are the more

likely they are to participate in financial markets, invest in stocks, and plan for retirement—all of which are seen as positive financial behaviors (vanRooj, Lusardi, & Alessi, 2011; Yoong, 2011; deBassa Scheresberg, 2013; Almenberg & Deber, 2011; Arrondel, Debbich, & Savignac, 2012; Lusardi & Mitchell, 2007 and 2011).

2.2. Financial Education/Financial Literacy among Young Adults

Borden, Less, Serido, and Collins at the University of Arizona are conducting a longitudinal study that began in 2007 with first-year college students. By re-surveying members of the cohort, the researchers are able to study the relationship between college financial behaviors and adult financial capability and to understand how early financial behaviors contribute to success and well-being in adulthood. In the 2011 wave of this study, the researchers found that (1) high school and college students who are exposed to cumulative financial education show an increase in financial knowledge and (2) increases in financial knowledge promote a sense of financial self-efficacy that drives increasingly responsible financial behavior as these students become young adults—that is, there is a "snowball effect" through which early financial education efforts increase the likelihood that students pursue more financial education as time goes on.

The FINRA (2014) study mentioned previously supplies further evidence regarding the relationship between financial education and financial behaviors. FINRA found those with higher scores in financial knowledge and decision-making were more likely to plan for retirement, more likely to have a rainy-day fund, and less likely to engage in costly credit card behaviors.

The College Savings Foundation's 2012 survey of college graduates ages 20 to 35 found that 36 percent of those who graduated within the last year had to live with their parents longer than expected compared with 24 percent of those who graduated 7 or more years earlier (College

Savings Foundation, 2012). Only 70 percent of those who graduated within the year were employed compared with 79 percent of those who graduated 7 or more years earlier. Forty percent of those who graduated within the last year were definitely delaying buying a house for financial reasons compared with 22 percent of those who graduated seven or more years earlier. Although these survey results may be related to the most recent recession, they point to increased financial stress and the need for financial literacy to help promote sound financial decision-making.

2.3. Measuring the Effects of Financial Literacy/Education

According to Lusardi and Mitchell (2014), one way to determine the effects of financial literacy on economic outcomes is to use a field experiment, such as the one implemented in this study. In such experiments the treatment group is exposed to a financial education program and their behaviors are compared with those of the control group that was not exposed to the financial education program. Collins and O'Rourke (2010) describe this as the "golden rule" of program evaluation. Walstad, Rebeck, and MacDonald (2010) conducted such an experiment to evaluate use of a personal finance video series in high school classrooms. Their evaluation results show a significant increase in personal finance knowledge among the students in the treatment group when compared with those in the control group. A study conducted by Harter and Harter (2007) using the Financial Fitness for Life (FFFL) curriculum provides evidence that the use of the FFFL curriculum program in middle schools and high schools increased financial literacy among students in Kentucky. Butt, Haessler, and Schug (2008) conducted a study using FFFL as well and found that students' knowledge gains pre to post-test were statistically significant and that they significantly outperformed students who did not participate in the program.

3. Methodology

3.1. Study Design

The NSC is a 45-contact-hour course, of which UCC allotted 2.5 contact hours (plus homework time) to the new financial literacy curriculum unit.[2] FRB sought to cover the most content possible, given this time constraint, and made its decisions on what content to include based on the *National Standards for Financial Literacy* (CEE, 2013). All of the lessons in the resulting curriculum unit came from existing FRB material, which undergo a rigorous review process including classroom pilots. Some modifications to the existing lessons were necessary for the lessons to be taught in the timeframe allowed. Information on the curriculum, by unit, with corresponding lessons and modifications can be found in the appendix.

In the fall of 2013, there were 102 sections of NSC across the six campuses. Because this is a large course offering, UCC employs an NSC course coordinator who facilitates hiring course instructors, makes curriculum decisions, coordinates professional development, and handles all communication with the instructors regarding course logistics. The coordinator also teaches three sections of the course. Because she was a decision-maker with respect to the curriculum, her three sections were excluded from the study. Additionally, there were eight dual-credit sections with students enrolled from local high schools. Because these students might be under the age of 18 and unable to provide their own consent for participation in the research study, they were also excluded. Finally, one section was dropped at the end of the study because the instructor failed to complete the study requirements.[3] Thus, the study included 93 sections of NSC.

[2] This is the equivalent to one week of a 15-week course.
[3] Participation in the study was required by UCC as a condition for teaching NSC; however, it was not possible to issue repercussions for failure to complete study components during the semester. Instead, instructors who failed to fully comply would not be considered eligible for rehire in subsequent semesters.

Sections were randomly assigned, via randomized cluster assignment,[4] to one of two conditions: treatment or control. In the treatment sections the instructors taught the new financial literacy curriculum unit and in the control sections the instructors taught the usual course with not changes. There were 62 treatment sections with 37 instructors and 1,299 students. There were 31 control sections with 15 instructors and 683 students. All treatment instructors of the NSC were trained to use new financial literacy curriculum directly by the lead researcher. Instructors were given the choice of how they wanted to obtain training: in-person during their UCC professional development day or via webinar. In both cases, the training lasted for 2 hours. Participation was nearly equally distributed across the training types (53% in-person v. 47% webinar).

Two instruments were used in this study: a test for the students and a survey for the instructors.[5] The pre- and post-test questions were taken from the Financial Fitness for Life (FFFL) High School examiners manual. The advantage of using these questions is that they have gone through a national norming process. A possible disadvantage of using these questions is that they were designed to accompany the FFFL curriculum, which was not used in this study. However, it is ultimately advantageous to use a nationally normed assessment in a curriculum intervention study. An assessment developed to "fit" a curriculum may bias the effect of the treatment such that if an assessment is written specifically to accompany a curriculum, the students are much more likely to perform well on it. Use of a nationally normed assessment, while covering similar content, avoids this problem.

[4] The clustering agent was the instructor. Once a teacher was randomly assigned to a condition, all of that teacher's subsequent sections were assigned to that same condition.. Sections per instructor ranged from one to five with an average of 1.75.

[5] Both instruments are available in the Appendix.

To accommodate instructors who wanted to test during class time and help ensure student participation, we selected only ten questions from the entire FFFL test for our testing instrument. We determined what content should be tested based on the amount of time allotted to each topic in the curriculum. For example, the credit unit was sixty minutes, which is 40% of the curriculum unit; thus, four of the test questions covered the topic of credit. We also varied the cognitive demand levels by selecting three level-one items, four level-two items, and three level-three items. The testing instrument was piloted with two different classes (a principles of microeconomics course at an area university and a local high school economics class comprising only seniors). Unfortunately, the test was not piloted with students from UCC because of timing issues. The average test score in the piloting phase was 43.6%.[6]

During the study, all UCC student testing was conducted through the FRB's online course portal. Students were given unique usernames and passwords and the test questions and the pre- and post-test as part of their course homework grade. However, the homework grade was based on completion only and not the actual score on the test. Answers were randomized such that no two students would see the test, or corresponding answers, in the exact same order. Instructors were given three options for conducting testing: during class time in a computer lab, during class time on the student's own device, or on the student's own time. Students, regardless of condition, were required to complete both. Given that test questions were randomized, most instructors tested their classes in the computer labs (see Table 1), and that the score did not count towards their grade, we believe the students had little incentive to cheat on this assessment.

Students were able to pre-test from September 1st to September 30th and post-test from October 30th to November 30th. The reason for this broad testing window was twofold. First, UCC instructors are required to cover certain core content in the course, but they may do so in

[6] This is consistent with the pre-test results across conditions as shown in Table 1.

almost any order they please. So, the testing windows had to be broad. Treatment instructors were then responsible for making sure they taught the financial literacy curriculum after their students had pre-tested, but before the post-testing period began. Second, the broad window of testing meant that the shortest amount of time that could elapse between pre- and post-testing was 30 days; thus, the post-test captured not only what they learned in the unit, but also how much they retained.

The second instrument used was an instructor survey. The survey gathered demographic characteristics for all instructors. Questions were asked regarding the instructor's gender, race/ethnicity, education, major course of study, years of post-secondary teaching experience, and mode of pre- and post-testing students. For the treatment instructors only, the survey went on to ask a series of affective questions about the curriculum. Due to limitations placed on us by the Human Subject Committee, we were unable to gather this same demographic information at the student level and therefore have student demographic data aggregated only to the classroom level.

Table 1 below provides summary statistics at the classroom level for items captured by the testing instruments across conditions, for sections without missing data. Differences in pre- and post-test scores across conditions are discussed later, in the results section of this paper. As the table shows, 80% of students participated in the pre-test, but participation dropped to 63% on the post-test. This difference does take into account students who dropped from the course, so the loss is real in terms of student mortality on the post-test.[7] We expect the participation rate to be a predictor of student test scores by acting as a proxy for section motivation and/or

[7] Participation rates are calculated as the number of students testing divided by the number of students currently enrolled in the section. The average pre-test score of students who both pre and post-tested is 42.52%. The average pre-test score of students who pre-tested, but did not post-test is 41.66%. This difference is not statistically different (t-statistic -0.93, p-value 0.3522) thus we do not believe our model suffers from selection bias.

engagement. Fifty-seven percent of the sections are located at the City Center campus, 20% at the City South campus, and the remaining 23% being dispersed through the other four campuses. On average, sections are 47% male, 29% Black/African-American, 12% other minorities (which largely comprises Hispanics), and 59% White. The average student age is almost 24 years old. Sixty-five percent of sections pre-tested as a whole group during class time in the computer lab, and this increased to 69% for the post-test. Finally, with respect to section-level variables, teachers reported that 21% of the sections in the sample are of below-average academic ability when compared with other sections the instructor has taught.

With respect to the teacher-level variables, 23% of teachers were male and 69% were White. They have an average of 8 years of teaching experiences, and 79% hold a master's degree or higher. The affective questions were asked only of the treatment instructors at the end of their experience with the curriculum unit. Seventy-three percent of them either strongly agreed or agreed that they felt adequately prepared to teach the unit. Seventy-three percent also reported that they were excited to teach the unit, and 78% thought the content they taught was valuable to their students. A little more than half of the teachers thought the difficulty level was appropriate. Finally, only 39% of teachers reported that if given the chance they would teach the unit again.

Table 1. Classroom-Level Summary Statistics

Variable	n	Mean	Std Dev
Student-Level Variables (Aggregated to Classroom Level)			
Pre-Test Score	86	0.43	0.05
Treatment	59	0.42	0.05
Control	27	0.43	0.05
Post-Test Score	86	0.51	0.09

Treatment	59	0.53	0.09
Control	27	0.47	0.09
Pre-Test Participation Rate	86	0.80	0.13
Post-Test Participation Rate	86	0.63	0.20
Section-Level Variables			
Campus = City Center	86	0.57	0.50
Campus = City South	86	0.20	0.40
Campus = County South	86	0.03	0.18
Campus = County East	86	0.09	0.29
Campus = Technology	86	0.06	0.24
Campus = County North	86	0.05	0.21
% Male	86	0.47	0.15
% Black	86	0.29	0.20
% Other Minority	86	0.12	0.09
% White	86	0.59	0.24
Avg. Student Age	86	23.84	3.13
Pre-Tested in Computer Lab	86	0.65	0.48
Post-Tested in Computer Lab	86	0.69	0.47
Academic Ability (Below Avg. = 1)	86	0.21	0.41
Teacher-Level Variables			
Treatment	86	0.69	0.47
Male	86	0.23	0.42
White	86	0.69	0.47
Years of Teaching Experience	86	8.06	9.56
Education = Masters+	86	0.79	0.41
Received In-Person Training	59	0.53	0.50
Felt Prepared to Teach Unit (SA or A =1)	59	0.73	0.45
Excited To Teach Unit (SA or A = 1)	59	0.73	0.45

Table 1 continued.

Thought Difficulty Level Was Appropriate (SA or A = 1)	59	0.56	0.50
Thought Unit Was Valuable (SA or A = 1)	59	0.78	0.42

Would Teach Unit Again (SA or A =1)	59	0.39	0.49

Note. n = 59 represents survey responses that were only asked to the treatment group teachers

3.2. Models and Econometrics

We model post-test scores as a function of the independent variables via an education production function. We use two different models in our analysis: (i) ordinary least squares (OLS) multiple regression analysis at the classroom level and (ii) hierarchical linear modeling (HLM), which is a multi-level analysis method. Because OLS is a commonly used econometric technique, we focus our attention only on potential issues with aggregating the data. We then suggest HLM as a solution and explain the details of this modeling technique.

Model 1 takes the form:

(1) $Post_s = f(Pre_s, C_s, T_s)$

where: Post = Average student post-test score for section *s*;
Pre = Average student pre-test score for section *s*;
C = Vector of classroom-level characteristics (including aggregated student demographic information) for section *s*; and
T = Vector of teacher demographic characteristics for section *s*.

For empirical estimation, the production function takes the form:

(1a) $Post = \beta_0 + \beta_1 Pre + \beta_2 C + \beta_3 T + u.$

where β_1 through β_3 are the corresponding parameters and u is error term.

One of the assumptions underlying OLS modeling is independence of observations. With our data, this assumption is violated (discussed in further detail below) and OLS regression produces standard errors that are too small. In addition, because outcomes are gathered at the individual level and other variables are gathered at the section or teacher level, a decision had to be made about dealing with the cross-level nature of the data. An option is to aggregate up to the level of section or instructor, which we have done with our OLS model above. In this case the

analysis would involve the effect of teacher or section characteristics on average classroom achievement. However, in this situation (referred to as "aggregation bias") it is proposed that "as much of 80-90% of the individual variability on the outcome variable is lost, which leads to dramatic over or under-estimation of observed relationships between variables" (Osbourne, pg. 1, 2000). In addition, the outcome variable changes from individual achievement to average classroom achievement, which is also problematic. Because this approach can produce misestimated standard errors, an alternative is to employ the use of hierarchical linear modeling.

3.2.1. Hierarchical Linear Modeling. HLM models are often referred to as multi-level linear models or nested models because individual units of study are grouped (or nested) within higher level units. For example, patients nested within doctors, individuals nested within families, or in the case with our data, students nested within sections and teachers. HLM is frequently used in education research because students exist in a hierarchical structure of the classroom, instructor, and school; that is, students are nested within classrooms, classrooms are nested within schools, and schools are nested within districts (Sullivan, Dukes, & Losina, 1999).

It is important to account for the nested nature of the data because people who exist within a hierarchy are more similar to each other than people randomly sampled from the population. For example, in this study students in NSC classrooms at UCC are more similar to one another than a random sample of students from the population as a whole. Further, students who choose to attend UCC do so for similar reasons such as geography, cost, admission standards, and types of programs offered. As a result, these students come from a community or a part of the community that are more homogeneous than the population as a whole (Osbourne, 2000). Additionally, students within a particular NSC section share the same experience regarding the instructor, the classroom environment, and their in-classroom experiences. This

leads to more homogeneity as well. So, observations based on these individual students are not fully independent. HLM alleviates these problems by incorporating a unique random effect for each organizational unit (i.e., students, sections, teachers) into the model and the variability of these random effects is taken into account when estimating standard errors (Raudenbush & Bryk, 2002).

We use a three-level model in this study (student – section – teacher). Three levels are necessary because a teacher is able to teach more than one section, but all of the students are from the same school.[8] The details on the models, by level, are below:

Student-Level Model

(2a) $\text{Post}_{ijk} = \pi_{0jk} + \pi_{1jk}\,\text{Pre}_{ijk} + e_{ijk}$

Where:

Post_{ijk} = the post-test score for student *i*, in section *j*, with teacher *k*;
Pre_{ijk} = pre-test score for student *i*, in classroom *j*, with teacher *k*; and
e_{ijk} = student-level random effect (assumed to be normally distributed, with a mean of zero and variance of σ^2).

Section-Level Model

(2b) $\pi_{0jk} = \beta_{00k} + \beta_{01k}\,\text{Treatment}_{jk} + \ldots + \beta_{pk}\,S_{pjk} + r_{0jk}$
$\pi_{1jk} = \beta_{10k}$

Where:

Treatment_{jk} = a dummy variable equal to 1 if section *j* with teacher *k* was in the treatment condition and 0 otherwise;
S_{pjk} = *p* =1…, P section-level characteristics for classroom *j* with teacher *k*; and
r_{0jk} = section-level random effect.

Teacher-Level Model

[8] UCC has six campuses, which could alternatively be the highest organizational level. However, each teacher teaches only at one campus (even if they have multiple sections) and the distribution of sections at campuses other than City Center is small (i.e., City Center accounts for almost 60% of the sections with the remaining 40% distributed throughout the other five campuses), thus there would be very little within-campus variation.

(2c) $\beta_{00k} = \gamma_{000} + \ldots + \beta_{ppk} T_{ppk} + u_{00k}$
$\beta_{pk} = \gamma_{ppk}$

Where:

T_{ppjk} = pp = 01..,PP teacher-level characteristics for teacher k; and
u_{00k} = teacher-level random effect.

By substitution, the Mixed Model takes the form:

(2d) $\text{Post}_{ijk} = \gamma_{000} + \ldots + \beta_{ppk} T_{ppk} + u_{00k} + \beta_{01k} \text{Treatment}_{jk} + \ldots + \beta_{pk} S_{pjk} + r_{0jk} + \pi_{1jk} \text{Pre}_{ijk} + e_{ijk}$

Using HLM allows us to answer an additional research question:

2) How much of the variance in financial literacy achievement scores is attributable to students, sections, and teachers?

4. Results

As Table 1 showed, the average pre-test score was 42% in the treatment condition and 43% in the control condition. Using a pooled-sample t-test, we find the difference in pre-test scores is not statistically significant (t-statistic 1.04, p-value 0.3026) and conclude that both conditions start out with the same level of financial literacy. On the post-test, the average score was 53% for treatment and 47% for control, which is statistically significant difference (t-statistic -2.68, p-value 0.0090). This is an increase of approximately 11 and 4 percentage points (or 26% and 9%) respectively.[9] Thus, using a difference-of-means analysis, it is clear that the financial literacy curriculum did impact student financial literacy as measured by student test scores.

Next, we use multiple-regression analysis to explain variations in post-test scores with respect to covariates thought to influence financial literacy test scores in order to fully answer our research question. Results from the OLS regressions, using model one, are reported in Table

[9] There is a small increase in the control condition between pre- and post-test scores because the existing NSC curriculum (i.e., the textbook *Focus on Community College Success* [2014]) dedicates a few pages to the concept of budgeting. Thus, the increase in post-test scores is directly attributed to more students correctly answering the 'budgeting' question on the post-test. This was expected.

2. We begin with a model that includes only the student-level data aggregated up to the section level (column 1), but include treatment as a covariate because that ultimately is the variable of interest. We then build on the model to include section-level characteristics (column 2) and finally to include teacher-level characteristics (column 3).

Table 2. OLS Estimation of Post-Test Score, Sections with Non-Missing Data Only

	-1-		-2-		-3-	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Intercept	0.24 **	0.11	0.39 ***	0.14	0.38 ***	0.14
Treatment	0.06 ***	0.02	0.06 **	0.02	0.05 **	0.03
Pre-Test	0.49 **	0.19	0.46 **	0.20	0.46 **	0.21
Pre-Participation	0.03	0.07	0.09	0.08	0.06	0.09
Post-Participation	-0.01	0.05	-0.05	0.05	-0.06	0.06
Campus = City Center			0.02	0.03	0.02	0.03
Section %Male			0.02	0.07	0.004	0.07
Section %White			-0.04	0.06	-0.04	0.06
Section Avg. Age			-0.01	0.00	-0.01	0.00
Section Pre-Test in Lab			-0.03	0.03	-0.03	0.03
Section Post-Test in Lab			-0.002	0.02	0.01	0.02
Section Academic Ability			0.06 **	0.03	0.03	0.03
Teacher is Male					-0.02	0.03
Teacher is White					0.001	0.02
Years of Teaching Exp.					0.002	0.00
Teacher Educ = Masters+					0.01	0.03
R-Squared		0.15		0.28		0.32

Note. n = 86; ***p<0.01; **p<0.05; *p<0.10

As expected, across all three models, being in the treatment condition is a positive, significant predictor of test scores. On average, students who received the financial literacy curriculum will score about 5 to 6 (depending on the model) percentage points better than students who did not receive the curriculum. Additionally, across all three models, average pre-test score is a large, positive, significant predictor of post-test scores. This points to the importance of controlling for existing levels of financial literacy knowledge when trying to determine the impact of a particular treatment. The large and significant constants across the

models suggest that there are also other influences on post-test score that are not accounted for with the existing covariates, but this was as expected.[10]

In the second model only, a section's academic ability is a positive significant predictor of post-test scores. This result goes against our *a priori* expectations in two ways. First, we would have expected the sections' academic ability to be a significant predictor in the second and third model, but it is not statistically significant once we include the teacher-level covariates. Second, because this variable is coded as 1 for students in sections with "below average" ability and 0 for students in "average" or "above average" sections, the positive sign on the coefficient is extremely puzzling. This indicates that sections with lower academic ability will do better on the post-test by about 6 percentage points. However, information on a section's academic ability was obtained through the teacher survey instrument where we asked them to rate their section's academic ability compared with other sections they have taught. It could be that instructors inaccurately assessed their ability of their section. It could also be that the design of the survey led instructors to assign the same level of academic ability to all of their sections when there might have been noticeable differences between sections.

To our surprise, no other covariates are statistically significant as the models are presented. We include the pre- and post- section participation rates to capture motivation effects at the section-level. We expected sections that were less motivated (or engaged) would score worse on the post-test. Either this is not the case or (more likely) using participation rates is not the best measure of the section's motivation. We also thought the location of the section, represented by what campus it resides in, might affect scores, but this does not appear to be the

[10] Because most of the variation in post-test scores is directly attributed to students (which is confirmed with HLM results in the next section) and we do not have any demographic characteristics at the student-level such as gender or race, a large intercept makes sense. We address the lack of student-level characteristics as a limitation to this study in the conclusion section.

case. Perhaps we need a more sensitive measure of potential differences across campuses. Additionally, it was surprising that none of the section demographic characteristics were significant. However, this is likely because they are average section characteristics. Finally, we thought that the mode of testing may play a role in student test scores. For example, it may have been that the students who complete the test as a group activity (i.e., the entire section pre- or post-tested in the computer lab) were likely to do better. Again, this does not appear to be the case.

Next, we take the non-missing data sample and pair it down to the 59 treatment sections only in order to examine any differences in training methods or affective questions from the survey. The results of using OLS regression are presented in Table 3. We see that the affective question regarding the difficulty level of the curriculum is the only covariate to influence post-test scores in a statistically significant way. The results show that the scores were about 6 percentage points higher when the teacher strongly agreed or agreed that the difficulty level of the curriculum was appropriate for his or her students. This is an interesting result considering only 56% (as reported in Table 1) of the instructors strongly agreed or agreed to this question (which is the second least favorable response on the affective questions). Thirty-nine percent of teachers disagreed or strongly disagreed with "if given the chance they would teach the curriculum unit again." This was the most unfavorable response to an affective question. *A priori* we would have expected this slightly negative attitude toward the curriculum to have spilled over to the student post-test scores and that, while the coefficient is negative, it is not statistically significant. We also expected the positive attitudes about teaching the curriculum as captured by being excited to teach it and/or thinking it was valuable to have positively influenced post-test

scores as some studies have found that teacher attitudes can influence student test scores (e.g., Marlin, 1991). That does not appear to be the case with our study.

Table 3. OLS Estimating of Post-Test Scores, Treatment Sections with Non-Missing Data Only

Variable	Coeff.		SE
Intercept	0.24	**	0.10
Pre-Test	0.56	**	0.22
Received In-Person Training	-0.01		0.02
Felt Prepared to Teach Unit	-0.03		0.03
Excited To Teach Unit	0.03		0.03
Thought Difficulty Level Was Appropriate	0.06	**	0.03
Thought Unit Was Valuable	0.04		0.03
Would Teach Unit Again	-0.01		0.03
R-Squared			0.24

Note. n = 59; ***p<0.01; **p<0.05; *p<0.10

Because of the potential problems of aggregating the student test scores to the classroom level addressed previously, we examined the data using HLM. Results from HLM regressions, using model 2, are reported in Table 4. In column one, we show results from running the unconditional model with no covariates. This information is needed to calculate the intraclass correlation coefficient (ICC), which measures the proportion of variance in the outcome that is between groups. For example, the ICCs for the teacher (T) and section (S) level are calculated as follows:

$$\mathrm{ICC}_T = \frac{\sigma_T^2}{\sigma_e^2 + \sigma_T^2 + \sigma_S^2}$$

$$\mathrm{ICC}_S = \frac{\sigma_S^2}{\sigma_e^2 + \sigma_T^2 + \sigma_S^2}$$

Column 2 presents the results from the HLM regression, using observations at the student level without missing data (at any level). Specifically, column two shows results from the best fitting conditional model with covariates.

Table 4. HLM Estimation of Post-Test Score, Students with Non-Missing Data Only

	-1-		-2-	
	Coeff.	SE	Coeff.	SE
Fixed Effects				
Intercept	0.5037 ***	0.0117	0.2581 ***	0.0236
Treatment			0.0743 ***	0.0228
Pre-Test			0.4475 ***	0.0310
Section Academic Ability			0.0517 *	0.0286
Error Variance				
Level-1	0.0338 ***	0.0013	0.0278 ***	0.0012
Intercept (Teacher)	0.0034 **	0.0010	0.0024 ***	0.0010
Intercept (Section)	0.0022 ***	0.0014	0.0021 **	0.0009
Model Fit				
AIC		-557.7		-707.4
BIC		-549.9		-707.4

Note. n = 1,084; ***p<0.01; **p<0.05; *p<0.10

Examining the unconditional model shown in column one first, we see that all of the error variance coefficients are significant. This indicates that sections and teachers do differ in their post-test scores in a statistically significant way. Additionally, the larger coefficient on the level-1 (or student) coefficient signals that more of the variation in post-test scores is attributable to students. Using the formulas presented above, we calculate the ICC at each level and, in fact, this is exactly what we see. Specifically, we find that 8.7% of the variation in post-test scores exists within teachers, 5.6% of the variation exists within sections, and 85.6% of the variation exists within students ($100 - ICC_T - ICC_S$).

Looking at the conditional model presented in column two, we see that the intercept, treatment, pre-test score, and section academic ability all differ significantly from zero. The

positive, statistically significant coefficient on treatment suggests that students in the intervention group report higher post-test scores. On average, students in the treatment will score about 7 percentage points better than students in the control condition. We also see that a section's academic ability (as described by the teacher) and existing level of financial knowledge are statistically significant predictors of post-test scores. Finally, the significant coefficients on the covariance parameter estimates also indicate that there are significant differences in average post-test scores across and between levels. Thus, there is enough evidence to conclude that the course-wide intervention program did have a positive effect on financial literacy. Specifically, after controlling for existing stock of knowledge via pre-test scores and the section's academic ability, the difference between financial literacy for students in the intervention sections is significantly different than the financial literacy for sections in the control condition.

5. Conclusion

Our study sought to (i) establish the financial literacy levels of UCC's incoming new students and (ii) to determine whether a financial literacy curriculum unit, as part of the NSC, could positively influence financial literacy. We find UCC's incoming new students existing stock of knowledge to be low (42-43% correct on a ten question assessment) and see gains, on average, of about 5 to 7 percentage points (depending on the model) for students who received the intervention. Thus, we conclude that there is a positive impact on student financial literacy from receiving the FRB financial literacy curriculum unit.

Furthermore, while we see gains, we acknowledge that their *ex-post* stock of knowledge is low as well. We certainly would like to see student post-test scores in the 80% or higher range, but it is important to keep in mind that the gains realized were done so as the result of only 2.5 classroom contact hours. We believe, and have made a recommendation to UCC accordingly,

that if more time were dedicated to the financial literacy curriculum unit within the New Student Course that much larger gains could be realized.

Finally, we employed the use of hierarchical linear modeling to account for the nested nature of our data and alleviate potential cross-level issues presented with OLS. This modeling technique also allowed us to determine the variation in student post-test scores across levels. We find that 8.7% of the variation in post-test scores exists within teachers, 5.6% of the variation exists within sections, and 85.6% of the variation exists within students.

Lastly, it is important to acknowledge some of the limitations of our study in order for our results to be meaningful. First, the biggest limitation of our study is the lack of student-level demographic data. As previously mentioned, limitations placed on us by UCC's Human Subjects Committee were the cause of this and beyond our control. Additionally, this study is obviously based on a specific curriculum at a specific community college. Caution is warranted if trying to apply these findings to other contexts.

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Appendix

Table A1. Financial Literacy Curriculum Unit

Unit	Time (mins)	Lesson	Modifications
Income	30	It's Your Paycheck, Lesson 1 Invest in yourself	Omit procedure step 17
		(Homework) Page One Economics Article "Investing In Yourself"	Omit "For Further Discussion" section
Saving	45	It's Your Paycheck, Lesson 5: Savvy Savers	Omit Handouts 5.2 and 5.3 and corresponding procedure steps
		No-Frills Money Skills: Growing Money – Compound Interest – Episode 1	
Credit	60	Cards, Cars & Currency, Lesson 2: Credit Cards- A Package Deal	Procedure steps 1 – 8 only and use Handouts 2.4, 2.5 and 2.6 as a group work activity
		It's Your Paycheck, Lesson 7, Creditors' Criteria and Borrowers' Rights and Responsibilities	Procedure steps 1 – 5 only
		(Homework) Credit Cred Online Course	
Budgeting	15	It's Your Paycheck: Lesson 4 – Your Budget Plan	Procedure steps 1 – 5 only, Handout 4.6 + creating their own budget

Note. Lessons referenced can be found at http://www.stlouisfed.org/education_resources/

Testing Instrument

1. Human capital consists of:
    a. knowledge and skills.
    b. stocks and bonds.
    c. plant and equipment.
    d. savings and investment.

2. What is the difference between gross and net pay?
    a. Net pay is gross pay minus saving.
    b. Gross pay is net pay minus saving.
    c. Gross pay is net pay minus deductions.
    d. Net pay is gross pay minus deductions.

3. Charlie opens a savings account and deposits $500. If the savings account has a fixed annual interest rate of 5 percent, and he makes no additional deposits or withdrawals, what amount will Charlie have in his savings account at the end of two years?
    a. exactly $505.
    b. exactly $550.
    c. less than $550
    d. more than $550.

4. About how many years would it take for $1,000 to become $2,000 if $1,000 is deposited in a savings account with an interest rate of 7.2 percent?
    a. 7.2
    b. 10.0
    c. 14.4
    d. 20.0

5. What is the general relationship between risk and reward?
    a. the higher the risk, the lower the potential reward.
    b. the higher the risk, the higher the potential reward.
    c. the amount of risk does not influence potential reward.
    d. there is a relationship, but it is uncertain.

6. A key advantage of getting credit is that it can help people:
    a. sell assets.
    b. increase their net worth.
    c. reduce risk when investing in stocks.
    d. buy a good or service today and pay for it later.

7. Which three things do creditors consider to be most important when judging a person's creditworthiness to buy a house or a car?
    a. marital status, gender, location
    b. character, collateral, and capacity
    c. length of loan, credibility, commissions
    d. occupations, connections, income sources

8. What is the relationship between the interest rate charged an individual and a person's risk of nonpayment of a loan?

a. a relationship exists, but it can be either direct or indirect
b. the lower the risk of nonpayment, the higher the interest rate
c. the higher the risk of nonpayment, the higher the interest rate
d. no relationship exists between interest rate and risk of nonpayment

9. Which type of financial institution typically charges the highest interest rate for loans?

a. credit unions
b. commercial banks
c. savings and loans
d. payday loan companies

10. Disposable income is the money that is:

a. spent or saved after deductions.
b. deducted from your paycheck.
c. budgeted for variable expenses.
d. saved and invested each month.

Survey Instrument

1. What is your gender?
    a. Male
    b. Female

2. Which of the following best describes your race/ethnicity?
    a. White
    b. Black or African American
    c. Hispanic or Latino
    d. Asian
    e. American Indian or Alaska Native
    f. Native Hawaiian or other Pacific Islander

3. Counting this year, how many years have you worked as a post-secondary teacher/instructor/professor? If less than 6 months total, enter "00"

4. What is the highest academic degree you hold?
    a. High-school diploma or GED
    b. Associates degree/vocational certification
    c. Bachelor's degree
    d. Master's degree
    e. Education specialist or professional diploma based on at least one year's work past master's degree
    f. Doctorate (e.g. Ph.D.)
    g. Professional degree (e.g. M.D., L.L.B., J.D., D.D.S.)

5. For your highest academic degree, what was your major course of study?

6. For the student **pre-test**, what was the mode of testing?
    a. Took students to computer lab during class time
    b. Allowed students to take test in class on their own devices
    c. Students took test on their own, outside of class

7. For the student **post-test**, what was the mode of testing?
    a. Took students to computer lab during class time
    b. Allowed students to take test in class on their own devices
    c. Students took test on their own, outside of class

8. In general, how would you rate the academic ability of your students compared to other students at UCC? If you have multiple sections, answer considering all of your sections.
    a. Above average
    b. About the same or average
    c. Below average

<*For treatment instructors only questions 9 – 14*>

9. I was adequately prepared to teach the financial literacy curriculum unit as part of the NSC 100 course.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree

10. I was excited or enthusiastic about teaching the financial literacy curriculum unit as part of the NSC 100 course.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree

11. The difficultly level of financial literacy curriculum material was appropriate for my students.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree

12. The financial literacy content was valuable or benefited my students.
    a. Strongly Agree
    b. Agree
    c. Disagree

d. Strongly Disagree

13. If given the opportunity, I would use this curriculum again in my NSC 100 course(s).
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree

14. We value your feedback, please provide suggestions to help us improve the financial literacy curriculum materials and/or training going forward.