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THE DECLINE OF FINANCIAL LITERACY IN YOUNGER GENERATIONS

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ABSTRACT

Overall knowledge regarding basic financial concepts has been a point of struggle for many individuals, in the United States and abroad, that has resulted in shockingly poor financial literacy seen across the world. The CFA Society Pittsburgh is attempting to improve financial education and literacy with their high school financial literacy program, which has been proven statistically significant. The question is, however, how the COVID-19 Pandemic has impacted students' ability to learn financial literacy. Teachers and students who participated in the financial education program verified the duration of their individual programs and the mode that the teachers were teaching; virtually, in-person, or a hybrid version. We conclude from the results that that in-person learning is more efficient than hybrid/virtual learning in the areas of financial behavior and students' self-esteem. Furthermore, evidence shows that males have exemplified a greater knowledge of financial literacy overall while females exhibit a greater improvement in financial knowledge.

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Chapter 1

Introduction

Currently, the state of financial literacy and numeracy in the United States and worldwide is in distress. Based on the results of multiple academic studies conducted in the United States and worldwide, a significant lack of financial literacy exists across nearly all demographics. While financial literacy statistics are important by themselves, the implications of financial literacy and numeracy are far reaching due to their impact on financial decisions. As a result, the potential implications of financial literacy and numeracy will be explored in depth. Most importantly, effective methods to improve financial literacy need to be put into place to increase financial literacy and numeracy.

Financial literacy is a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate, short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions. As a general description, financial literacy is the understanding of fundamental concepts that influence personal financial behavior. Studies use many different knowledge-based questions to gauge financial literacy; however, the overall concepts remain relatively consistent across financial literacy surveys. Three common fundamental financial knowledge concepts exist: interest rates, inflation, and risk diversification.

This study extends prior research on the effectiveness of financial literacy education by providing direct evidence from a financial literacy campaign launched by the CFA Society of Pittsburgh. The study is based upon data collected from a financial literacy campaign of 10 high schools during the 2020-2021 academic year. The financial literacy education campaign materials were created using the book The Missing Semester as the primary resource. Before

starting the course, students were given a pre-survey to test their baseline in four major areas: subjective financial knowledge, financial behavior, objective financial knowledge, and financial self-esteem. Following the course's completion, students were tested in a post-survey on the improvement in the four major areas. To anonymously track the progress of students, they were assigned a unique student ID code. The results display significant improvement in all areas of interest, indicating an effective financial literacy improvement effort.

Chapter 2

Literature Review

Financial Literacy

Financial literacy is critical because the knowledge and skills enable the proper use, accumulation, increase, and management of incomes while directly affecting countries' economies. In context, financial literacy refers to the knowledge of financial concepts and applications that are vitally important in everyday life (Semercioglu and Akcay, 2016). Financial literacy programs primarily aim to develop a better understanding of the financial knowledge of individuals. Semercioglu and Akcay (2016) conclude that low-level financial literacy across numerous countries is associated with a lack of financial training for individuals in their traditional education experience.

The United States offers an example of a financial literacy system in need of improvement. Only 49% of Americans with a college education can answer a handful of basic questions regarding financial literacy (Faulkner, 2017). According to the Financial Industry Regulatory Authority (FINRA), only 14% of U.S. citizens can answer a series of five basic personal finance questions correctly. Faulkner believes that the observed lack of financial literacy is positively correlated because household spending in the United States has consistently ranked among the highest globally. Essentially, lower financial literacy is contributing to higher spending habits of individuals. Additionally, the average savings rate in the United States has hovered around 5%, while the recommended level according to the U.S. Bureau of Economic Analysis is often double this value (Faulkner, 2017).

To better understand the lack of financial literacy within the United States, Jang, Hagn, and Park (2014) develop a measure comparing student financial literacy in the United States with South Korea. The United States has created financial programs across schools for decades, while South Korea is in the early stages of implementation. Jang et al. find that South Korean students, who have significantly less exposure to financial concepts, performed better in financial cognitive tasks. Conversely, U.S. students, who had more exposure to financial education programs, scored lower in cognitive knowledge. Jang et al. propose an explanation for this disparity. They discover that Korean students self-reported acquiring financial knowledge through social and ethical experiences and any formal academic programs offered. Another possible explanation is that high schools in the United States may be missing out on a critical component in their financial literacy programs.

Financial Behavior and Individual Attitudes

Financial Education and Age

Henager and Cude (2016) note that there has been increased academic research focusing on financial literacy and renewed interest in financial education and related policy in the last decade. School-based financial education programs have increased across the country over the past decade. An increase in state mandates for financial education in high schools and the creation of entities (e.g., the Financial Literacy and Education Commission and the Consumer Financial Protection Bureau) addressing financial literacy shows an increase in attention to improving financial literacy across the country. Henager and Cude consider how financial knowledge correlates with short-term and long-term behavior segmented by age group. They

discover a positive correlation between financial literacy and both short-term and long-term financial behavior. An example of short-term financial behavior is paying your monthly bills on time, while long-term behavior could be saving for retirement. They also find oldest age group was 78% more likely to engage in short-term financial behaviors than the youngest age group, more commonly referred to as Generation Z (Gen Z).

Pangestu and Karnadi (2019) analyze the influence of financial literacy with a sample of Indonesian students who are members of Gen Z. They report that in 2013, the Indonesian Financial Services Authority (FSA) conducted a survey and found that only 21.84% of Gen Z participants were financially literate. The FSA proposed that those who are financially literate would be more likely to be more prudent in financial planning and express it in the forms of savings and investment. Pangestu and Karnadi develop a financial literacy questionnaire comprised of three dimensions (financial attitude, financial behavior, and financial knowledge). Data was gathered from 430 respondents using a questionnaire that was sent out via email. The findings of their study can be categorized into two main sub-groups, age, and gender. First, the financial program shows that a positive correlation exists between financial knowledge and age (i.e., the older the student is, the higher their literacy score). Second, improvements in financial literacy are more frequently observed in women than in men. This finding implies that women are building from a lower financial literacy base, which results in a more significant observed improvement. Pangestu and Karnai (2019) conclude that the individuals with the least amount of financial knowledge and behavior are younger generations, women especially, highlighting the importance of financial education in high schools across the United States.

European Studies of Financial Behavior

Amagir, Groot, Maassen van den Brink, and Wilschut (2020) examine levels of financial literacy (e.g., knowledge, attitudes, self-efficacy, and self-reported behavior) among 15-year-old high school students in the Netherlands (N = 2,025). They investigate which granular factors are associated with different financial literacy components. A pre-survey was sent out to the schools asking if the students participating had received any previous financial education from the school curriculum. Students were given 50 minutes in class to complete a paper-pencil questionnaire consisting of a background section, a financial knowledge test, and a survey. The survey was designed to assess attitudes towards money, financial self-efficacy, self-reported financial behavior, financial experiences, and financial socialization issues. Amagir et al. conclude that school-based financial education is positively associated with higher financial knowledge scores.

Results also show that financial education makes a difference in how much confidence students have in their ability to manage money (i.e., self-esteem). Interestingly, they find that financial socialization factors, such as discussing money matters with peers and parents, relate more strongly to attitudes towards money and financial behavior than the financial education provided in high school. However, the implementation of socialization factors does not deter the Netherlands survey findings regarding the positive correlation between financial education and financial knowledge. As with Henager and Cude (2016) and Pangestu and Karnai (2019), Amagir et al. (2020) find a positive correlation between financial education programs and financial literacy.

A similar test was conducted in Italy to study the effect of financial education on high school students' investment attitudes. Becchetti, Caiazza, and Coviello (2013) create a randomized experiment measuring the relationship between financial literacy and virtual portfolio investment in a 16-hour finance course with 944 students in 36 different classrooms.

They evaluate the effects with a questionnaire administered before and after the standardized course. Each course offering used a unique instructor. However, so that it could be standardized across all the classes, they all used the same materials, which included (i) a set of slides; (ii) a short guide for the teacher which illustrated the guidelines to be followed in their lessons; and (iii) a more detailed guide to the available materials specifically designed for the students.

The findings document that a 16-hour financial education course significantly affects students' financial literacy, their propensity to read (and capacity to understand) economic articles in newspapers, and their virtual investment attitudes. Becchetti et al. (2013) find significant improvements when they consider both student and class average observations. Considerable progress is also found in classes in which students fill out the pre- and post-questionnaires within the same time interval but do not attend the course, highlighting that participation is a key element to financial education. Finally, Becchetti et al. (2013) find a greater level of financial literacy progress within those categories with poorer notions of financial literacy, implying that financial education courses are significantly more effective when the pre-survey reveals a weaker knowledge of financial concepts.

Stella, Filotto, Cervellati, and Graziano (2020) study whether participation in financial education programs during school positively affects financial literacy levels. A survey was distributed to 918 adults containing questions about basic financial concepts with an additional question to note previous participation in financial education programs during school. Stella et al. (2020) hypothesized that adults who participated in financial programs while attending school would exhibit a higher financial literacy rate than those without the education. They find that participation in financial education programs was statistically significant and positively affected financial knowledge, skills, and attitudes. Further analysis showed a positive correlation between

the length of the high school's financial program and the adults' percentage correct on the questionnaire. Adults who took a year-long high school program showed higher scores than adults who took a financial education program for a semester or less. Stella et al. (2020) use their data to push for educational reform with an increase in financial education programs across school curricula in Italy.

Another important factor in determining the importance of financial literacy in individuals is their intertemporal choices, which are decisions at one time that affect future options. Luhrmann, Serra-Garcia, and Winter (2018) examine the effect of financial education on adolescents' intertemporal choice, targeting financial education programs for adolescents with in-school delivery. Their study included 900 students from 25 high schools that implemented a German nonprofit organization's financial education program, *My Finance Coach*. Finance coaches, who are employees of various (for-profit) firms that sponsor the *My Finance Coach* program, are sent to the schools. These coaches are unpaid volunteers. Three, 90-minute visits were conducted for a combined total of 4.5 hours dedicated to several training modules. The nonprofit providing *My Finance Coach* offers a set of materials for each module and trains the coaches, so the educational program is standardized (Luhrmann et al., 2018).

Luhrmann et al. (2018) show that the *My Finance Coach* program produces statistically significant improvements in changing how youth make intertemporal choices, enhance their understanding, and broaden the set of alternatives they consider when making those intertemporal choices. As with Stella et al. (2020) and Becchetti et al. (2013), Luhrmann et al. (2018) reinforce the argument that the implementation of high school financial education programs results in statistically significant improvements in students' overall financial literacy.

Financial Knowledge and Numeracy

Lacking Knowledge

Gomez and Villagomez (2016) study a financial literacy survey conducted among high school students aged 15 to 18 in Mexico City. The study represents the first significant effort to measure financial literacy among young students in Mexico. Their questionnaire contained 45 questions divided into 6 sections, which were further dissected into three categories including financial knowledge, financial attitude, and financial behavior. A high score in financial knowledge means that the student received a score of at least 75% while, in financial behavior, a high score needed at least 80%. Finally, a high financial attitude score is attained if the student tends to disagree with the statements on average (Gomez and Villagomez, 2016). They discover that only 18.3% of their respondents scored well in financial knowledge, 57.3% scored well in financial behavior, and almost 70% received high scores on financial attitudes. Approximately 15% of the students did not obtain any points, reflecting a complete lack of financial literacy. Gomez and Villagomez emphasize the importance of financial knowledge and note the lack of understanding of basic financial calculations from the students who participated in the survey. Overall, only 31.7% of the respondents answered questions about compound interest correctly, while only 22% were able to compute repayments on a loan. They conclude that mathematical and financial ability are positively and significantly correlated with financial knowledge, which leads to a better understanding of basic financial concepts.

Jayaraman and Jambunatham (2018) measure improvements in financial literacy levels among 608 high school students in India, rendering similar results to that of the study done by Gomez and Villagomez. Jayaraman and Jambunatham begin with the baseline that there is very

little focus on financial education in Indian high schools. They conducted a survey consisting of 28 questions to test financial education's performance in four financial literacy domains: compound interest/inflation, investing, borrowing, and insurance. Post-analyses from the questionnaire reveal the percentage correct scores (PCS) for the four financial literacy domains. The mean PCSs for compound interest, investing, borrowing, and insurance were 44.5%, 44%, 40.2%, and 49.6%, respectively.

Interestingly, while Gomez and Villagomez (2016) show that numeracy and mathematical skills were among the lowest in Mexican students, Jayaraman and Jambunatham (2018) find that the highest scores on their survey were on questions evaluating numeracy. Indian high schools are tailored more towards basic math skills in general, so this is no surprise. With this tailoring of math skills, the two surveys conducted in Mexico and India show a positive correlation with math education and financial literacy. Jayaraman and Jambunatham (2018) conclude that high schools' financial education programs should include subjects geared towards numeracy and mathematical ability.

If numeracy is a crucial portion of schools' financial education programs, more research is needed to teach these topics effectively. Specifically, Jayaraman and Jambunatham (2018) see that students find it challenging to apply basic math skills to questions involving compound interest calculations. Students also scored much lower on questions regarding an understanding of the term “inflation” instead of other questions, which address the concept of inflation without using the actual term. Financial education programs may not have a lasting impact on a student’s financial capabilities unless students can connect the concept with terminology. Although the studies by Jayaraman and Jambunatham (2018) and Gomez and Villagomez (2016) show the diverse effect of cultural differences on financial education, both emphasize the statistical

significance and positive correlation that financial education and financial numeracy have with each other and reinforce the argument in favor of implementing more financial education programs in high school curriculums.

Mathematics and Education

One purpose of implementing financial literacy programs across high schools is to increase students' knowledge of basic financial concepts, making smarter financial decisions as an adult. Brown, Grigsby, Klaauw, Wen, and Zafar (2016) consider the effects of exposure to financial training on early adults' debt outcomes based on their high school's inclusion of financial literacy training. Brown et al. analyze large-scale changes in financial training exposure using a sample of young Americans and their debt behaviors over the decade immediately following the high school training to see if the financial trading has had any positive impact on their behavior. They find that financial and quantitative education during high school has moderate impacts on young adults' financial decisions aged 19 to 29. Brown et al. also find that mathematics training implemented for a longer duration leads to improved financial well-being and a decrease in adverse outcomes, such as deferral of debt payments. Math education, however, was shown to lack any long-term impact on students' financial behavior, which increasingly faded overtime through early adulthood to the point where individuals did not retain the majority of the information they were taught (Brown et al., 2016).

Erner, Goedde-Menke, and Oberste (2016) conduct a survey of 1,500 tenth-grade students across 25 German high schools to explore financial literacy inclusion in school curricula. A set of five basic and eight sophisticated financial literacy questions comprised the survey. The basic financial literacy questions cover elementary financial concepts, such as compound interest and the time value of money. In contrast, the sophisticated questions cover

more specific topics related to investing and financial products. Erner et al. find that students in their sample correctly answered 64.2% of the basic financial questions and 53.6% of the sophisticated financial questions. The question with the highest percentage-correct across the board was the one specifically regarding numeracy. They saw that the basic-level question regarding compound interest exhibited a relatively sharp drop of correct responses. A decline in accuracy regarding compound interest indicates that high school students find it difficult to apply the mathematical concepts they understand to similar financial literacy computations. Erner et al. conclude that lower mathematical skills are statistically significant and positively correlated to lower levels of basic financial literacy, and some form of financial education should be implemented in the German school curriculum.

Gill and Bhattacharya (2019) take a different approach in assessing financial knowledge in high schools by having teachers educate 11th and 12th-grade students themselves instead of giving the teachers of the school the coursework for the pre- and post-survey analyses. They seek to determine if the input mix of financial literacy curricula matters concerning changes in financial knowledge. To accomplish that goal, the curriculum varies the instruction time devoted to money management (MM), such as budgeting expenses or balancing a checkbook, and financial investment (FI) topics about different investment strategies and assets. A total of 1,128 students across 8 class periods over eight weeks were able to participate, with half of the students instructed in money management and the other half in financial investment topics.

After receiving instruction at each school, the students answered a 40-question comprehensive financial literacy test with 80% of the questions requiring some type of mathematical or numeracy ability. Gill and Bhattacharya (2019) conduct post-program analysis discovering strong evidence that their financial literacy instruction provided gains in financial

knowledge over what a standard semester-long economics course would teach. They conclude that the eight-class-period treatment of money management and financial investment topics increased students' financial knowledge by about 13 percentage points after controlling for certain variables such as gender and GPA. This result validates the continued need to teach financial education in high school, even if it is for a short time.

Online Financial Education Programs

Digital Financial Literacy and Fin Tech

Digital financial literacy (DFL), the education of financial literacy through digital platforms, is likely to become an increasingly important aspect of education for the Information Age. The Information Age progression brings the development of the 'gig' economy, which is a labor market including short-term contracts or freelance work. This transition means that individuals can become more responsible for their financial planning, including retirement, among other goals (Morgan, Huang, Trinh, 2019). During the past 20 years, many technological advances emerged across the globe that have impacted the structure of several countries, and yet various educational systems have not adequately adapted to a digital learning environment. Financial technology (fintech), using software, applications, and digital platforms to deliver financial services to consumers and businesses through digital devices such as smartphones, has become recognized as a promising tool to promote financial inclusion. Inclusion involves necessary access to financial products and services provided to excluded households and small firms (Morgan et al., 2019).

FinTech is revolutionizing the financial services industry at a very rapid pace. Views differ regarding the likely impact that FinTech is expected to have on personal financial

planning, well-being, and societal welfare (Panos and Wilson, 2020). One question that many scholars have is whether the implementation of FinTech in the high school curriculum will have a material effect on students' improvement of financial knowledge. Panos and Wilson (2020) argue that financial literacy research should make financial education more effective through improved design and delivery of the content. The disadvantage of enabling a more user-friendly and easily accessible program online is that students might develop misconceptions of certain topics more often than if they were engaged in an in-person program. Panos and Wilson indicate that students had a misunderstanding of the risk/reward tradeoff with derivatives more so than any other topic due to the program's online nature. If enough student participants form this misconception, then there is a possibility it could splinter into other misconceptions related to basic financial knowledge. While derivatives are not a simple financial concept, its misconception found by Panos and Wilson (2020) highlights a disadvantage on the prospect of an asynchronous approach to online financial education.

Effectiveness and Improvement of Online Modules

According to the FDIC, 80% of the states in the U.S. have currently adopted some kind of personal finance education standard, up from 42% in 1998. While the numbers show an improvement, these states do not mandate financial education. With only 29.7% of schools offering any form of financial education, the students' need for financial education is not adequately satisfied. Wolla (2017), a member of the Federal Reserve Bank of St. Louis, reveals its potential for meeting students' financial literacy needs using resources developed by the Fed Bank, which believes online resources enhance financial literacy in K-12 schools. One of the resources is called *Soar to Savings*, an online learning module that teaches essential personal finance and economics concepts. The objective of Wolla's study is to use quantitative statistical

analysis to determine whether the *Soar to Savings* online module is an effective tool for increasing high school students' financial knowledge.

Wolla's study investigates if statistically significant differences exist in completing the *Soar to Savings* online module. His study is based on 3,061 sets of pre-test and post-test scores of students across 100 schools. Wolla (2017) concludes that a statistically significant increase exists in scores from both the overall student results (N = 3,061) and the school results (N = 100). Overall, the results confirm that the paired samples at both levels indicate that the *Soar to Savings* online module is an effective tool for increasing financial knowledge among high school students. Wolla (2017) recommends greater access to online financial education programs in high schools across the country.

Although traditional printed materials and in-person classroom-style workshops are most prevalent, technological advances have created online financial education opportunities in recent years (Kim, Russel, and Schroeder, 2017). Government studies, however, show that Wolla's findings are not broadly applied to all schools since most of the schools do not include online modules. While programs such as the *Soar to Savings* online module are gaining momentum in high schools, relevant research and theoretical frameworks have infrequently been considered in the development of such programs. Kim et al. (2017) shows an imbalance of the benefit provided by online financial literacy programs.

While Wolla (2017) and Panos and Wilson (2020) show evidence in favor of students' increase in financial knowledge after financial literacy programs, other studies question the methodological rigor and whether the "improvement" of student knowledge diminishes overtime. Kim et al. (2017) argue that Wolla (2017) finds that programs do not adequately measure the students' knowledge retention after the post-test was completed. A key implication

described by Kim et al. is that many financial education programs, such as *Soar to Savings*, lack an explicit theory to frame the delivery of information. This lack of framework explains the findings that students lose retention of learned financial concepts over time.

Technology is integrated into everyday life, and offering online financial education may offer alternative and innovative ways to reach broader audiences (Kim et al., 2017). However, this process requires more than just publishing previously printed materials online. Financial educators and practitioners should design effective and interactive online programs and tools that build knowledge, facilitate improved financial decision-making, and foster positive behavior change. Kim et al. (2017) provide several recommendations to incorporate financial concepts into the school curriculum.

First, online tools and resources can be used to extend in-person educational encounters by allowing for more flexibility and frequency between student and teacher. These digital resources can provide a more accessible way for students to get involved in the program. Websites could be created that offer tools, lectures, webinars, videos, downloadable documents, activities, worksheets, and other resources for "on-demand" learning, which would be especially useful for schools that offer financial education programs as an extracurricular activity. Second, standalone online educational programs should be tailored for specific financial behaviors and specific audiences. Targeted programs (e.g., programs derived from surveys of student populations or social media campaigns for specific user groups) may be more effective than general financial education (Kim et al., 2017). Third, multiple modalities such as blogs, online games, chatrooms, and smartphone apps could be employed by teachers to accommodate a range of various learning styles, which should increase students' overall engagement of the program. Finally, Kim et al. (2017) recommend that educators structure programs with reminders, alerts,

and prompts to help students monitor their progress and keep them engaged throughout the program's entire duration.

Improving Financial Education Programs

Methods of Financial Education

Despite thousands of programs and tremendous public and private interest in improving financial decision-making, little is known about how best to teach financial education. Using an experimental approach, Skimmyhorn, Davies, Mun, and Mitchell (2016) estimate the effects of two different education methodologies (principles-based and rules-of-thumb) on various measures of overall financial literacy. These measures include self-assessed knowledge, financial self-efficacy, motivation to learn, willingness to seek advice, and risk preferences. The two methodologies were observed within a mandatory course while randomly assigning students and teaching methods to instructors. Students completed four two-hour lab periods focused on personal finance using either a principle-based (PB) or a rule-of-thumb (ROT) methodology. In addition to the lab, students were required to take a standard economics course (forty 55-minute class periods).

Principal-based methods are aligned with theoretical concepts. This methodology is based on traditional personal finance instruction that teaches students general skills (e.g., the financial planning process, classic consumption tradeoffs, the value of budgeting, and the time value of money). Specific topics such as building an emergency fund, investing, purchasing insurance, and the decision to buy (or lease) a car and buy (or rent) a home are also covered using the PB method. Skimmyhorn et al. (2016) design the ROT method using an existing financial education program from a nonprofit organization named *Moneythink*. This method

aimed to simplify how information was presented and avoid lengthy discussion of detailed theories as used in principal-based methods. Data was collected, for both the PB and the ROT methods, from online pre- and post-assessments (99 percent completion rate) required as part of a course.

During the course, participants were told the potential advantages of the PB method over the ROT method. Skimmyhorn et al. (2016) conclude that students' financial choices for new financial decisions presented to them were neither covered in the course nor presented in the initial assessment. One potential advantage of a PB financial education is its ability to teach students skills that can be used in new contexts. The PB methodology appears to generate more significant gains in self-efficacy, while the ROT method reduces individuals' willingness to seek advice. Skimmyhorn et al. (2016) suggest that a Principal-based approach to financial education programs is the more effective way of teaching financial concepts.

Iterbeke, De Witte, Declerq, and Schelfhout (2019) examine the impact of ability matching and differentiated instruction on eighth and ninth-grade students' learning outcomes in a financial education program. Their study uses two randomized control trials involving 65 schools and 2,407 students. The financial education program was offered as an interactive learning game for which students were organized into pairs. Each teacher was required to follow a specific process to help guarantee implementation effectiveness across all schools. First, to avoid interference from parents, the material had to be delivered during regular class hours. Second, to measure the impact of the program, all students had to take three financial literacy tests: (1) a pre-treatment test before the financial education program; (2) a test measuring the baseline financial proficiency of students; and (3) two post-treatment tests, capturing potential short- and long-term impacts of the program (Iterbeke et al. 2019).

The final results of the experiment by Iterbeke et al. 2019 showed that students' proficiency in financial literacy increased by 0.18 standard deviations immediately following completion of the program. Iterbeke et al. (2019) argue that an increase in financial knowledge primarily drove the observed improvement in financial proficiency. Students' financial behavior appeared unaffected by the program. On average, considering all types of students, Iterbeke et al. (2019) found no observation exists on general effects of ability matching and differentiated instruction for students' short-term financial proficiency, financial knowledge, and financial behavior when accounting for imperfect teacher compliance (i.e., not every teacher utilizing the program effectively). However, approximately six weeks after the lectures, students for whom ability matching and differentiated instruction were implemented were found to retain the increase in financial knowledge compared to the other experimental conditions (Iterbeke et al., 2019).

Measuring the effectiveness of a financial education program can be a challenge for researchers, especially when the true impact lags at the end of the study. An important part of financial education programs is having accurate and efficient data from students to conduct analyses. Shi, Prevett, Farnsworth, Kwong, Wan, He, Zhai, and Zhen (2019) develop a Monte Carlo simulation to model changes in items relating to students' perceptions of personal finance and financial products. They analyzed data from a sample of 1,250 students (aged 16–18) across 99 schools who participated in a financial capability education study in the United Kingdom. Shi et al. (2019) examined if an activity, such as a training course, will produce changes over time. They assumed that change would be reflected by a difference in the responses given to the same question over the training course (Shi et al. 2019).

Shi et al. (2019) provide a two-fold contribution. First, a new method for modeling the changes of time-varying categorical responses was developed. Second, it also provides a decision model for modeling a time point change on students' personal financial attitudes and behaviors. Interestingly, the Monte Carlo simulation validates the importance of an initial response and posterior response, which has been crucial for many analyses on financial education programs' effectiveness.

Student Participation

Several studies, including Shi et al. (2019) and Iterbeke et al. (2019), critique the possibility that students participating in financial literacy programs will lose the knowledge gained as time passes. Luhrman, Serra-Garcia, and Winter (2014) also address the concern about the potential time decay of knowledge by examining the impact of a short financial education program on teenagers in German high schools to determine if interest in the program made a material difference in students' improvement of understanding financial concepts. Before students were involved in the program, a pre-survey was sent out that showed more than 38% of student participants showed no interest in financial matters. Students then had to complete three 90-minute training modules focused on shopping, planning, and saving.

Luhrman et al. (2014) reveal that the relatively short financial education program significantly increases both knowledge of, and interest in, financial matters. Particularly, interest in financial matters increased by about 20% which also showed an increase in retention of the financial concepts from the training modules. Furthermore, raising participant interest was the first step towards increasing their financial literacy and engagement with future financial matters. According to Luhrman et al., self-assed financial knowledge increased by roughly 21% and students' actual financial knowledge is positively correlated with the training.

While the research analyzed by Luhrman et al. (2014) highlights the positive effects that short-term financial programs have on high school students, Frisancho (2019) argues against unintended adverse shocks that might occur as a result of the programs. One potential side effect could be a shift in student priority from entering the workforce to continued schooling, decreasing the overall labor force participation. Another potential drawback of a financial education program is that its positive effect could be concentrated among a few advantaged students, widening initial inequalities. Frisancho believes that searching for adverse side effects of financial programs was just as important as implementing them across schools.

After careful analyses of financial programs across countries, including Brazil, Peru, and Germany, Frisancho (2019) concludes that school-based financial education programs are a very effective policy tool to increase financial knowledge among children and youth. Measured learning gains are impressive, especially in programs that involve attempting to improve mathematical performance in school. Evidence by Frisancho (2019) further shows that the far-reaching effect sizes identified for financial programs tailored towards youth are derived from delivery models that incorporate personal finance through a mandatory course requirement as opposed to voluntary after-school programs. Most importantly, Frisancho (2019) determines that school-based financial programs do not seem to have unintended adverse effects on students.

Service-learning has become an increasingly popular alternative form of teaching financial literacy in undergraduate business programs (Jones, Petrie, Murrell, 2018). For example, a service-learning project could involve undergraduate business students leading short-term financial literacy education programs in their community or K-12 learning environments. Jones et al. (2018) note that financial education using a service-learning framework began to build momentum across the United States immediately following the financial crisis of 2007-

2008. Jones et al. (2018) further explain that financial literacy is a strong fit for participatory action research projects in which undergraduate business students provide high school students with financial education. To test the validity of the argument presented by Jones et al. (2018), three students from the University of Pittsburgh developed and administered a financial literacy pre-test and post-test across eight high schools in the City of Pittsburgh School District. The test included twelve questions with topics such as personal loans and credit. Jones et al. (2018) find that the students scored significantly higher on the post-test than the pre-test and conclude that the service-learning project conducted by the three undergraduate business students had an immediate impact on the financial literacy knowledge of the high school student participants.

Cameron, Calderwood, Cox, Lim, and Yamaoka (2014) suggest that younger generations are poorly prepared for making potentially life-changing financial decisions. The previous research provides multiple opportunities to enhance financial education programs to increase individuals' overall financial literacy knowledge. However, two particular findings are most notable, which relate to the modality (online/hybrid vs. in-person) and the program's length. First, assuming the research discussed remains true, individuals who are enrolled in more extended financial education programs tend to retain more of the concepts as time passes. Continual education improves their cognitive understanding and increases student's financial attitude and application of financial concepts with everyday life. Secondly, newer research conducted by Panos and Wilson (2020), Wolla (2017), and Kim et al. (2017) shows that online modules are effective in increasing student's short-term financial literacy, but question whether the modules have a lasting impact on their financial cognitive ability similar to what in-person education programs show. Therefore, creating longer financial education programs with the

flexibility of in-person or online modules can provide the most efficient form of increasing students' overall financial attitude, behavior, and literacy.

Chapter 3

Methodology and Hypothesis

Data Samples

Whole Sample participants of three individual surveys (pre, post, and teacher) that study the effectiveness of financial literacy education through the duration and mode of the course consisted of 2,186 students (1,622 in 2017-2019 and 564 in 2020-2021) across 87 schools (79 in 2017-2019 and 8 in 2020-2021). A description of each survey appears below:

- Pre-survey: distributed at the beginning of the financial education program by teachers that measures students' initial financial knowledge in four main categories; subjective knowledge, objective knowledge, behavior and self-esteem
- Post survey: distributed upon completion of the financial education program by teachers that measures the same four categories from the pre-survey to analyze
- Teacher survey: meant for teachers to fill out in order to obtain information about the individual financial education programs including program length, modality, and resources used to teach the material

Links for a pre-, post-, and teacher survey were provided to the participating teachers throughout those schools. Within the introductory email, instructors were given directions to assign each student with a unique ID number, allowing pre- and post-surveys to be matched for analysis. Instructors were also assigned their ID for the teacher surveys.

The surveys distributed were extensions of the work conducted by Filbeck, Zhao, and Pettner (2020). The three surveys can be found in Appendices A, B, and C, respectively. Pre-surveys in 2017-2019 were completed by 1,622 students, while 564 students did 2017-2019 pre-surveys. The test sample includes 833 students from 2017-2019 and 163 students from 2020-2021 that completed both the pre and post surveys.

Table 1 reports the descriptive statistics for the pre-survey sample and the post-survey sample. The pre-survey sample consists of 2,186 students completing the pre-survey, while the

post-survey sample including only 996 students who submitted both a pre- and post-survey. Of the pre-survey sample, 1,303 (90.9 percent) students are in their junior or senior year; in the post-survey sample, 880 (88.0 percent) students are in their junior or senior year. Female students account for approximately 47 percent in both the pre-survey sample and the post-survey sample. Additionally, students who participated during 2020-2021 make up 25 percent in the pre-survey sample and 16 percent in the post-survey sample.

Survey Methodology

Students' pre- and post-survey questions have been divided into two major categories: financial behavior and financial knowledge. The surveys are modified based on Filbeck, Zhao, and Pettner (2020). Financial knowledge questions are further split into objective and subjective financial knowledge. The surveys consist of 21 questions: three financial behavior, six objective financial knowledge, and 12 subjective financial knowledge. Subjective financial knowledge and financial behavior questions are rated on a 5-point scale ranging from "strongly disagree" (1) to "strongly agree" (5). The three financial behavior questions are "I like to save money more than I like to spend it," "I have a checking and/or a savings account," and "I have conversations with my parents regarding personal finance. Subjective financial knowledge questions involve perceived understanding of financial concepts. They include questions such as "I understand how to establish a financial plan," or "I understand the process by which my parents/guardians make financial decisions."

However, objective financial knowledge questions are conducted with "right" or "wrong" answers. Each objective financial knowledge question contains at least one wrong answer and the option to choose "I Don't Know." Five broad categories of financial literacy make up the survey questions: interest (numeracy), compound interest, inflation, and credit. The questions are analyzed using two methods: willingness to answer and correctness. The first method,

willingness to answer, assigns a score of 1 for an answer of "I Don't Know" and a score of 0 for any other answer. Secondly, questions with the correctness method assign a score of 1 for each correct answer and a score of 0 for any other answer.

The teacher survey comprises five informational questions regarding how the instructors are teaching financial literacy courses in their respective high schools. Of the five informative questions, two are focused on the mode of instruction, while the other three focus on the program's duration. Questions regarding the mode include: "How are you teaching the material?" and "What methods did you use to teach the material?" With respect to durational questions these include: "How many total contact hours will you spend teaching financial literacy?" "How often will students receive financial literacy instruction?" and "What best describes the total length of your financial literacy instruction program.

Hypothesis

The pre- and post-surveys are created to assess four key factors of financial success: self-esteem, perceived knowledge, behavior, and objective numeracy. This paper extends work done by Filbeck et al. 2020) by including a teacher survey to assess the modality of the courses taught in 2020-2021. Our hypotheses are as follows:

H1: The virtual/hybrid implementation of financial literacy education will have a statistically significant difference in students' performance compared to in-person learning.

$H2_A$: The performance of male students across both modalities will be greater, at the statistically significant level, than the overall performance of females in both modalities.

$H2_B$: Female students will show a greater improvement in knowledge, at the statistically significant level, across both modalities compared to male students.

If the hypotheses statements hold true, firstly, in-person financial education programs will prove more efficient than a virtual/hybrid instruction mode. The hypothesis falls in line with

research conducted by Amagir et al. (2020) which found that person-to-person financial education is positively associated with higher financial knowledge scores from their survey. Additionally, Panos and Wilson (2020) found in their research that virtual/hybrid modes of financial education courses failed to teach students in certain financial topics, stating a lack of direct student-to-teacher contact as the vital reason. These financial topics test students in both their objective and subjective based financial knowledge. Based on the previous research, the first hypothesis statement should hold true for the sample students in this survey.

Secondly, females and males would show a statistically significant difference in learning with virtual/hybrid courses than in-person, with females showing a greater improvement in financial knowledge than men. Pangestu and Karnai (2019) support this hypothesis by concluding in their research that, since women are building from a lower financial literacy base, a more significant improvement is observed when compared to men's improvement. Overall, in-person classes would increase students' financial knowledge and behavior, which ultimately improves the likelihood of financial success and responsibility.

Chapter 4

Test Results

Pre-Survey Analysis

For the t-test of the pre-survey responses, two characteristics are analyzed: student gender and the delivery mode of content. Student gender is divided into subgroups based on gender (female or male), while the delivery mode is based on year: in-person (2017-2019) or virtual/hybrid (2020-2021). Table 2 lists the initial results of the pre-surveys submitted by students categorized by the four areas of financial knowledge tested: subjective knowledge, financial behavior, objective questions, and self-esteem.

The pre-survey responses are divided by gender and modality are shown in Table 2. The average responses are compared to the individual subgroups of gender and the courses' modality. Compared to the total average response score for subjective financial knowledge questions, female students and those learning virtually/hybrid in 2020 scored lower (statistically significant at the 1 percent level). For financial behavior, students who partook virtually/hybrid are better financially behaved (statistically significant at the 1 percent level), while no statistically significant differences exist based on gender. Females scored lower in correctness regarding objective financial knowledge, while virtually/hybrid trained students scored higher in correctness.

Table 3 reports the response differences on “percent correct” between the whole sample, students with in-person learning, and students with virtual/hybrid learning for all four categories of questions: subjective, behavior, objective, and self-esteem. Interestingly enough, all data points from the four categories of questions that cross are statistically significant. For example,

the correct responses to behavioral questions are positively correlated to the objective financial questions (p-value <0.0001). Students who learned in a virtual/hybrid environment were more confident in their subjective and behavioral financial knowledge than students trained in-person but ultimately falter in their overall objective financial knowledge.

Post-Survey Analysis

The results of the pre- and post-surveys are compared using the post-survey sample of 833 students in 2017-2019 (in-person) and 163 students in 2020 (virtual). Improvement is defined in several ways. Gains from subjective financial knowledge, objective financial knowledge, and financial behavior are defined as the post-survey scores minus the pre-survey response scores. To gauge financial self-esteem, we define confidence gains as a decrease in the responses of "I Don't Know" in the post-survey minus the pre-survey. In other words, students exhibit better self-esteem when they have fewer "I Don't Know" answers in the post-survey compared to the pre-survey.

Table 4 illustrates the t-test results by question and overall score for each of the four items measured: subjective financial knowledge, financial behavior, objective financial knowledge, and financial self-esteem. The results show improvements with nearly every question in all categories, per question and total. Questions from subjective knowledge and financial behavior are graded on a basis of 1-5, 1 stating "I highly disagree" and 5 stating "I highly agree." For example, the financial behavior question "I like to save money more than I like to spend it" had an average pre-survey score of 3.545 and a post-survey score of 3.815. The increase shows that, on average, more students' preference for the balance between saving and spending had improved, improving their overall financial behavior. Each of the improvements is statistically significant at the 1 percent level, except for one question in the financial behavior

category “I have a checking and/or savings account.” Looking at Table 2, we see that the question had the lowest scores for students in 2020-2021 compared to the overall average. The low scoring could imply that the COVID-19 pandemic has had an impact on the results.

Starting with subjective financial knowledge, the most significant improvement of correct student responses comes from the understanding of Roth IRA (a gain of 1.667) and retirement (a gain of 1.355). These are nearly identical to a similar study done by Filbeck, Zhao, and Pettner (Filbeck et al. 2020), where the most significant gains in subjective financial knowledge were also an understanding of Roth IRAs and retirement. However, the analysis conducted in 2020-2021 combines this year’s and 2017-2019’s survey results from students. Since the sample is dominated by results from 2017-2019 (students who participated in-person), the subjective financial knowledge results show that the inclusion of the virtual responses did not statistically alter the gains. All subjective financial knowledge questions are statistically significant at the 1 percent level. Further analyzing the financial behavior questions' responses, the biggest gain derives from the importance of contributing to a retirement plan (a gain of 0.416). All questions are statistically significant, except for the question in the financial behavior category, “I have a checking and/or savings account.”

Meanwhile, the most significant improvements seen from objective financial knowledge regard questions involving credit, the concept about an agreement to purchase a product or service with the express promise to pay for it later (a gain of 0.245) and knowledge of compound interest (a gain of 0.333). The largest increase in correct responses between pre and post surveys comes from self-esteem questions (how often students answered “I Don’t Know” on the objective financial questions). Interestingly enough, the questions showing the most improvement in correctness for self-esteem questions are in the same category as the questions

regarding objective financial knowledge questions. Credit, purchasing goods or services with the obligation to pay later (a gain of 0.268), and compound interest (a gain of 0.21) are the two questions from the self-esteem category that have seen the most improvement, that is, less students answered “I Don’t Know” with those two questions than any other between the pre and post surveys. The results show a link between confidence to answer a question (self-esteem) and correctness (objective financial knowledge).

The t-test results analyze the first hypothesis of whether a statistically significant relationship differences exist based on the modality of instruction and the student’s improvement of the four key factors of success. Students learning from both modalities experienced positive gains in all four areas of questioning. However, only the results from financial behavior and self-esteem questions were deemed statistically significant at the 10% level. A 10% significant level with only two of the four areas of questioning ultimately fails to reject the null hypothesis and concludes that there is no statistically significant difference in learning based on modality. Furthermore, the improvements in all four categories were greater with students who learned in-person than students taught virtually or in a mixed mode. The results show that students were able to perform better with an in-person educational format compared to students who were taught completely online or in a hybrid format.

The second hypotheses state that men will have greater overall knowledge in financial literacy, while women will show a greater improvement in financial literacy. Both hypotheses are also analyzed by the t-test results from Table 5. Looking at objective knowledge questions from the surveys, males have higher overall scores with both the pre and post surveys (3.2252 and 4.0641 respectively) while female scores are lower at (2.7557 and 3.8778), all statistically significant at the 1 percent level. The same analysis can be concluded with the subjective

knowledge questions and self-esteem questions, with males showing overall higher scores. This ultimately rejects the null hypothesis in favor of the alternative hypothesis ($H2_A$) that males exhibit overall greater financial knowledge, regardless of modality.

When looking at Hypothesis 2_B, Table 5 shows the difference between pre and post scores from both males and females. Similar results from $H2_A$ are seen here, with the difference between pre and post scores of objective financial knowledge questions being higher with females (a 10.673 difference) than men (a 9.0252 difference) at the 1 percent statistically significant level. Again, the same conclusion can be drawn from the results of the subjective financial knowledge questions and self-esteem questions. The analysis ultimately rejects the null hypothesis in favor of the alternative hypothesis that females exhibit a greater improvement in financial knowledge compared to male improvement.

Teacher-Survey Analysis

In addition to pre- and post- survey distribution to schools and students, a teacher survey was sent out to the teachers/instructors in 2020 to gather information on the modality and duration of the financial education programs implemented in their respective classrooms. The questions to the Teacher Survey can be found in Appendix C. We received a total of 8 responses, in which two have stated their teaching was completely virtual while the other six stated a mix of in-person and virtual learning.

Question 5 on the Teacher Survey asked instructors what methods they used to teach the students. Out of the eight results, all included lectures and in-class individual applied projects as a part of their teaching, while seven use PowerPoint presentations. We can see these methods are associated with both virtual and hybrid teaching settings. Six of the eight teachers also stated in

their surveys that their program lengths were one semester, except for one indicating the use of a full academic year and one program that lasted two weeks.

These data points are integral in analyzing and interpreting the pre- and post-survey questions from students who had virtual or mixed learning. While the improvements of student responses in financial behavior and self-esteem from in the virtual/hybrid classroom are statistically significant, Table 5 shows no statistically significant improvement in subjective and objective financial knowledge questions.

Chapter 5

Conclusions

This study's primary purpose is to investigate the effectiveness of high school financial literacy education programs in a virtual/hybrid environment as opposed to an in-person environment. The improvement of financial literacy is measured in four areas: subjective financial knowledge, financial behavior, objective financial knowledge, and self-esteem.

The pre-survey results taken by students before beginning the financial education program are initially analyzed using a t-test. The results show students who participated in in-person learning are more likely to display better financial behavior and objective financial knowledge than students who learned through a virtual/hybrid manner. Similarly, male students are more likely to exhibit better objective financial knowledge and higher self-esteem.

To test the financial literacy program's effectiveness, a t-test was implemented between results of the pre- and post-survey, taken after completion of the course. The T-test analyzes the four major topic areas listed above. Overall, both male and female students experienced an increase in all four topics that were statistically significant except for financial behavior.

Objective financial knowledge, financial self-esteem, and subjective financial knowledge all improved for both genders and modes of learning. Through the questions in the survey, students were tested before and after the financial education programs on topics ranging from compound interest to education loans and retirement planning. Regardless of modality of delivery or gender, all students improved in all four of the financial categories.

Overall, based upon the analysis extracted from the surveys, statistically significant improvements in subjective financial knowledge, financial behavior, objective financial knowledge, and financial self-esteem lead us to conclude that the CFA Society Pittsburgh financial literacy program is successful at increasing students' chances of financial success. However, the analyses fail to prove that students who participated in 2017-2019 (an in-person teaching format) resulted in greater improvement relative to the 2020-2021 students who participated in a virtual/hybrid setting. Therefore, the analysis shows that the parts of the program that focus on behavior and self-esteem, although still successful at improving financial literacy among youth, are more effective when the teaching is being conducted in a social environment with person-to-person instruction.

Table 1: Sample Descriptions

Table 1 shows the number of students across different grade level sub grouped by modality and gender regarding pre and post surveys

		Grade				
		9th	10th	11th	12th	Total
Panel A. Pre-survey sample						
Year 2017-2019	Female	36	39	147	536	758
	Male	54	59	194	557	864
Year 2020-2021	Female	1	2	172	99	274
	Male	1	7	171	111	290
	Total	92	107	684	1303	2186
Panel B. Post-survey sample						
Year 2017-2019	Female	19	26	85	264	394
	Male	30	36	112	261	439
Year 2020-2021	Female	0	4	55	15	74
	Male	1	0	68	20	89
	Total	50	66	320	560	996

Table 2: Pre-Survey Differences based on Student Characteristics

Table 2 shows the differences of pre-survey student responses on financial knowledge and financial behavioral questions across different gender and GPA for the whole sample

	Average Response	Female	Year 2020-2021
Panel A. Financial subjective knowledge questions			
2. I understand how to establish a financial plan.	3.003	2.918	2.901
3. I think financial literacy is important for my future.	4.381	4.403	4.428
6. I understand the process by which my parents/guardians make financial decisions.	3.358	3.299	3.358
7. I know how to determine the appropriate total costs associated with the colleges/universities I am interested in attending.	3.034	3.020	2.883
8. I understand the process by which loan repayments take place including the impact of interest, delinquency and default.	2.737	2.598	2.721
9. I understand the process by which credit card charges and repayment schedules can impact the level of financial debt levels.	3.415	3.406	3.379
10. When it comes to purchasing a car, I know how to determine how much of a car I can afford.	3.265	3.126	3.203
11. I understand how to evaluate the cost-benefit analysis of training for the job I would like to perform after completing school.	3.001	2.897	2.963
12. I know what a Roth IRA is and how it works from a taxation standpoint.	1.958	1.835	1.981
13. I know how to create a savings plan based on the ability to estimate monthly living expenses.	3.115	3.070	3.019
14. I know how to plan financially for retirement.	2.609	2.472	2.573
Total score for financial subjective knowledge questions	33.750	32.982	33.337
Panel B. Financial behavior questions			
1. I like to save money more than I like to spend it.	3.522	3.4603	3.570
4. I have a checking and/or a savings account.	4.286	4.3114	4.048

5. I have conversations with my parents regarding personal finance.	3.455	3.4723	3.559
15. I think it is important to contribute to a retirement plan (ex: Roth IRA, 401k, etc.)	4.089	4.0930	4.105
Total score for financial behavior	14.872	14.947	15.233
Panel C. Objective questions (Correct Answers)[a]			
1. Is it safer to put your money into one investment or put your money into multiple investments?	0.631	0.566	0.657
2. If you invest $100 in a Roth IRA and earn 10% per year for 3 years, how much would it be worth at the end of three years.	0.293	0.235	0.302
3. If you use a credit card in January for a total of $300, which payment option will result in the lowest amount of overall interest paid.	0.497	0.465	0.500
4. Suppose you decide to buy a BMW for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?	0.435	0.369	0.445
5. In the future, the cost of things you buy doubles AND your income also doubles. How much will you be able to buy in the future in comparison to today?	0.563	0.528	0.572
6. Suppose you have $30,000 in student loans. Which payment option would result in the lowest amount of overall interest paid?	0.543	0.520	0.571
Total score for objective questions (Correct Answers)	2.963	2.684	3.048
Panel D. Objective questions ("I don't know" Answers)[b]			
1. Is it safer to put your money into one investment or put your money into multiple investments?	0.254	0.324	0.228
2. If you invest $100 in a Roth IRA and earn 10% per year for 3 years, how much would it be worth at the end of three years.	0.337	0.428	0.313
3. If you use a credit card in January for a total of $300, which payment option will result in the lowest amount of overall interest paid.	0.341	0.362	0.341

4. Suppose you decide to buy a BMW for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?	0.293	0.372	0.288
5. In the future, the cost of things you buy doubles AND your income also doubles. How much will you be able to buy in the future in comparison to today?	0.178	0.199	0.154
6. Suppose you have $30,000 in student loans. Which payment option would result in the lowest amount of overall interest paid?	0.283	0.321	0.272
Total score for objective questions ("I don't know" Answers)	1.686	2.006	1.5954

Table 3: Correlations between Whole Sample vs Student Characteristics

Table 3 describes correlations between the whole sample and modalities along with the four financial knowledge subjects for which students were tested.

		Subjective	Behavior	Objective	IDK Answers
Panel A. Whole sample					
Subjective	Corr	1.000	0.353	0.283	-0.360
	p-value		<.0001	<.0001	<.0001
Behavior	Corr	0.353	1.000	0.260	-0.261
	p-value	<.0001		<.0001	<.0001
Objective	Corr	0.283	0.260	1.000	-0.759
	p-value	<.0001	<.0001		<.0001
IDK Answers	Corr	-0.360	-0.261	-0.759	1.000
	p-value	<.0001	<.0001	<.0001	
Panel B. Year 2017-2019					
Subjective	Corr	1.000	0.349	0.291	-0.366
	p-value		<.0001	<.0001	<.0001
Behavior	Corr	0.349	1.000	0.255	-0.255
	p-value	<.0001		<.0001	<.0001
Objective	Corr	0.291	0.255	1.000	-0.753
	p-value	<.0001	<.0001		<.0001

IDK Answers	Corr	-0.366	-0.255	-0.753	1.000
	p-value	<.0001	<.0001	<.0001	
Panel C. Year 2020-2021					
Subjective	Corr	1.000	0.386	0.264	-0.348
	p-value		<.0001	<.0001	<.0001
Behavior	Corr	0.386	1.000	0.274	-0.278
	p-value	<.0001		<.0001	<.0001
Objective	Corr	0.264	0.274	1.000	-0.778
	p-value	<.0001	<.0001		<.0001
IDK Answers	Corr	-0.348	-0.278	-0.778	1.000
	p-value	<.0001	<.0001	<.0001	

Table 4: T-Test Results Between Pre and Post Survey

Table 4 shows the t-test results of student responses to financial behavior and knowledge questions before and after the financial literacy educational efforts for the test sample.

	Pre	Post	Diff	T-stat
Panel A. Financial subjective knowledge questions				
2. I understand how to establish a financial plan.	3.044	4.016	0.972	24.78***
3. I think financial literacy is important for my future.	4.388	4.653	0.247	10.08***
6. I understand the process by which my parents/guardians make financial decisions.	3.395	3.867	0.473	13.03***
7. I know how to determine the appropriate total costs associated with the colleges/universities I am interested in attending.	3.113	3.862	0.748	18.32***
8. I understand the process by which loan repayments take place including the impact of interest, delinquency and default.	2.738	3.830	1.092	26.1***
9. I understand the process by which credit card charges and repayment schedules can impact the level of financial debt levels.	3.423	4.191	0.765	18.96***
10. When it comes to purchasing a car, I know how to determine how much of a car I can afford.	3.285	4.172	0.888	22.24***
11. I understand how to evaluate the cost-benefit analysis of training for the job I would like to perform after completing school.	3.028	3.887	0.857	20.73***
12. I know what a Roth IRA is and how it works from a taxation standpoint.	1.904	3.571	1.667	35.83***
13. I know how to create a savings plan based on the ability to estimate monthly living expenses.	3.113	4.159	1.043	25.35***
14. I know how to plan financially for retirement.	2.598	3.948	1.355	30.54***
Total score for financial subjective knowledge questions	33.953	43.776	9.823	
Panel B. Financial behavior questions				
1. I like to save money more than I like to spend it.	3.545	3.815	0.270	7.49***
4. I have a checking and/or a savings account.	4.327	4.261	0.057	1.56
5. I have conversations with my parents regarding personal finance.	3.481	3.801	0.319	8.25***

15. I think it is important to contribute to a retirement plan (ex: Roth IRA, 401k, etc.)	4.060	4.476	0.416	11.98***
Total score for financial behavior	14.871	16.329	1.458	
Panel C. Objective questions (Correct Answers)[a]				
1. Is it safer to put your money into one investment or put your money into multiple investments?	0.640	0.684	0.044	2.31**
2. If you invest $100 in a Roth IRA and earn 5% per year for 3 years, how much would it be worth at the end of three years.	0.296	0.482	0.186	10***
3. If you use a credit card in January for a total of $500, which payment option will result in the lowest amount of overall interest paid.	0.493	0.738	0.245	13.76***
4. 4. Suppose you decide to buy an Audi for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?	0.443	0.577	0.134	6.89***
5. In the future, the cost of things you buy doubles BUT your income remains the same. How much will you be able to buy in the future in comparison to today?	0.578	0.773	0.194	10.97***
6. Suppose you have $40,000 in student debt. Which payment option will result in the lowest amount of overall interest paid?	0.548	0.719	0.171	9.19***
Total score for objective questions (Correct Answers)	2.998	3.974	0.976	
Panel D. Objective questions ("I don't know" Answers)[b]				
1. Is it safer to put your money into one investment or put your money into multiple investments?	0.245	0.049	-0.196	-13.47***
2. If you invest $100 in a Roth IRA and earn 5% per year for 3 years, how much would it be worth at the end of three years.	0.342	0.126	-0.215	-13.21***
3. If you use a credit card in January for a total of $500, which payment option will result in the lowest amount of overall interest paid.	0.342	0.074	-0.268	-17.17***
4. Suppose you decide to buy an Audi for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?	0.295	0.102	-0.192	-11.79***

5. In the future, the cost of things you buy doubles BUT your income remains the same. How much will you be able to buy in the future in comparison to today?	0.174	0.068	-0.106	-8.11***
6. Suppose you have $40,000 in student debt. Which payment option will result in the lowest amount of overall interest paid?	0.289	0.101	-0.187	-12.12***
Total score for objective questions ("I don't know" Answers)	1.686	0.521	-1.165	

Table 5: Differences in T-Test Results based on Student Characteristics

Table 5 shows the difference in t-Test Results based on student characteristics of the whole sample and results are broken into subgroups of male/female and modality of learning content.

	Financial behavior			Subjective questions			Objective questions			Esteem		
	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
Panel A. Subsamples by gender												
Male	14.819	16.233	1.413	34.528	43.553	9.0252***	3.2252	4.064	0.839**	1.427	0.464	-0.96***
Female	14.926	16.431	1.505	33.339	44.012	10.673***	2.7557	3.878	1.122**	1.962	0.581	-1.38***
Panel B. Subsamples by modality												
Year 2017-2019	14.794	16.334	1.53*	33.780	43.677	9.8968	2.9364	3.943	1.0072	1.769	0.554	-1.2149*
Year 2020-2021	15.254	16.303	1.04*	34.824	44.272	9.4485	3.3091	4.127	0.8182	1.266	0.351	-0.9152*

Appendix A

Pre-Survey Questions

Class Code:

Student ID:

Gender:

GPA:

Grade:

Favorite Subject in School:

____ English

____ Math

____ Social Studies

____ Science

Questions:

1. I like to save money more than I like to spend it.
2. I understand how to establish a financial plan.
3. I think financial literacy is important for my future.
4. I have a checking and/or a savings account.
5. I have conversations with my parents regarding personal finance.
6. I understand the process by which my parents/guardians make financial decisions.
7. I know how to determine the appropriate total costs associated with the colleges/universities I am interested in attending.
8. I understand the process by which loan repayments take place including the impact of interest, delinquency and default.
9. I understand the process by which credit card charges and repayment schedules can impact the level of financial debt levels.
10. When it comes to purchasing a car, I know how to determine how much of a car I can afford.
11. I understand how to evaluate the cost-benefit analysis of training for the job I would like to perform after completing school.
12. I know what a Roth IRA is and how it works from a taxation standpoint.
13. I know how to create a savings plan based on the ability to estimate monthly living expenses.
14. I know how to plan financially for retirement.

Learning Preferences:

I am able to master material when instruction includes:

1. Learning by doing/manipulating objects

2. Listening
3. Discussing with peers
4. Features visual support (e.g., PowerPoint slides)

Objective Questions:

1. Is it safer to put your money into one investment or put your money into multiple investments?
2. If you invest $100 in a Roth IRA and earn 10% per year for 3 years, how much would it be worth at the end of three years.
3. If you use a credit card in January for a total of $300, which payment option will result in the lowest amount of overall interest paid.
4. Suppose you decide to buy a BMW for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?
5. In the future, the cost of things you buy doubles AND your income also doubles. How much will you be able to buy in the future in comparison to today?
6. Suppose you have $30,000 in student loans. Which payment option would result in the lowest amount of overall interest paid?

Appendix B

Post-Survey Questions

Class Code:

Student ID:

Questions:

1. I like to save money more than I like to spend it.
2. I understand how to establish a financial plan.
3. I think financial literacy is important for my future.
4. I have a checking and/or a savings account.
5. I have conversations with my parents regarding personal finance.
6. I understand the process by which my parents/guardians make financial decisions.
7. I know how to determine the appropriate total costs associated with the colleges/universities I am interested in attending.
8. I understand the process by which loan repayments take place including the impact of interest, delinquency and default.
9. I understand the process by which credit card charges and repayment schedules can impact the level of financial debt levels.
10. When it comes to purchasing a car, I know how to determine how much of a car I can afford.
11. I understand how to evaluate the cost-benefit analysis of training for the job I would like to perform after completing school.
12. I know what a Roth IRA is and how it works from a taxation standpoint.
13. I know how to create a savings plan based on the ability to estimate monthly living expenses.
14. I know how to plan financially for retirement.
15. I think it is important to contribute to a retirement plan (ex. Roth IRA, 401k, etc.)

Learning Preferences:

I am able to master material when instruction includes:

1. Learning by doing/manipulating objects
2. Listening
3. Discussing with peers
4. Features visual support (e.g., PowerPoint slides)

Objective Questions:

1. Which is less risky: Investing your money into one investment or multiple investments?
2. If you invest $100 in a Roth IRA and earn 5% per year for 3 years, how much would it be worth at the end of three years.
3. If you use a credit card in January for a total of $500, which payment option will result in the lowest amount of overall interest paid.
4. Suppose you decide to buy an Audi for $50,000. If you take out an auto loan for 5 years with 5% interest, how much total will you pay per year?
5. In the future, the cost of things you buy doubles BUT your income remains the same.

How much will you be able to buy in the future in comparison to today?

6. Suppose you have $40,000 in student debt. Which payment option would result in the lowest amount of overall interest paid?

Appendix C

Teacher Survey Questions

Class Code:

Teacher ID:

Gender:

Questions:

1. How are you teaching the material?
2. How many total contact hours will you spend teaching financial literacy?
3. How often will students receive financial literacy instruction?
4. What best describes the total length of your financial literacy instruction program?
5. What methods did you use to teach the material? (Select all that apply).
6. Did you take a finance-related course in high school or college?
7. What subject do you teach?
8. What suggestions do you have about the program that we can improve next year?

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Academic Vita

JOSHUA R. BECHTOLD

Finance and Accounting major entering the workforce as an Associate Analyst with Ally Financial

EDUCATION

The Pennsylvania State University | Erie, PA **Graduation May 2021**
Bachelor of Science in Finance Schreyer Scholar
Bachelor of Science in Accounting
Financial Planning Certificate and Financial Controllership Certificate

ACCOUNTING & FINANCE RELATED EXPERIENCE

Treasurer, Business Analytics Team | Penn State **January 2019-April 2020**

- Analyze how current economic events impact equity markets and international business performance
- Predict future outcomes of companies through common size analysis and proforma statements
- Calculate financial ratios and prepare quarterly presentations of financial data to executives

Human Resource Simulations, Management | Penn State **August 2018-December 2018**

- Collaborated with teammates in creating our own human resources division for a firm
- Executed numerous decisions an owner would have to make to ensure maximum profits
- Organized who would be in charge and who would make certain decisions as head of HR

Financial Analysis, Fundamentals of Accounting | Penn State **January 2018-June 2018**

- Critically analyzed real world financial transactions and posted them in general journals
- Formulated financial documents such as balance sheets, income statements and statements of equity
- Prepared multiple bank reconciliations from both the banks and a company's perspective

LEADERSHIP AND COMMUNITY INVOLVEMENT

Financial Planning Association (FPA) | Penn State **January 2019- April 2020**

- Analyze proforma statements of small businesses versus large corporate institutions
- Creating a personalized budget with 1, 3, and 5-year projections by implementing financial equations

President, Delta Sigma Pi | Penn State **April 2018 - April 2020**

- Former President of a professional fraternity organized to foster the study of business in universities
- Awarded the Most Outstanding Pledge of Spring 2018

Lambda Sigma | Penn State **September 2018-May 2019**

- Member of an honors society promoting leadership, scholarship, fellowship and service
- Organized multiple community service and fundraiser events to give back to the community of Erie

BUSINESS EXPERIENCE

Portfolio Management Intern, Ally Financial | Cranberry, PA **June 2020-August 2020**

- Learned the process of analyzing auto dealerships across the country within Ally's systems
- Conducted financial analysis on different dealerships to decide which ones to do business with
- Created annual consumer credit reports to assess the productivity of the dealerships

Bank Teller, Mars Bank | Richland, PA **May 2018-August 2019**

- Operated a teller window and dealing with a cash drawer and ECR machine
- Processed a variety of transactions and customer service requests
- Educated customers with bank policies and regulations while assisting them in any way possible