To what extent do grade levels and the requirement of an economics course in high school impact the financial literacy levels of students in the United States?

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ABSTRACT

Young adults' financial literacy levels are on a steady decline. In response, more schools in the United States are beginning to incorporate financial education into their curriculums. This study aimed to answer the question, "To what extent do grade levels and the requirement of an economics course in high school impact the financial literacy levels of students in the United States?" This paper augmented previous research by examining the relationships between subjective and objective financial literacy levels based on various educational parameters. Analyzing these variables may provide more effective approaches to impact young adults' future financial behaviors through education. A review of literature on these topics suggest mixed results as to whether financial education improved students' financial behaviors. However, findings within this study indicate that high school students of upper-level grades displayed a stronger positive correlation between their objective and subjective financial literacy levels compared to students of lower level grades. Furthermore, research showed that improving the quality and availability of financial education curricula such as economic courses may help increase students' knowledge on financial topics.

Introduction

The current financial state of young adults from ages 18-25 is increasingly defined by high levels of debt. Consequently, this high level of indebtedness is contributing to the diminishing financial stability of young adults. In fact, according to a 2018 Financial Industry Regulatory Authority (FINRA) survey, 53% of adults reported feeling concerned and anxious while thinking about their financial situation. Furthermore, according to another FINRA survey during the same year, the financial literacy levels of young Americans are on a steady decline, with four in five failing a financial literacy assessment (Rose). Therefore, investigating whether factors such as students' grade levels and financial education curriculums affect their literacy levels may help researchers gain a better understanding behind the reason for poor financial practices among young adults. According to Breitbach and Walstad, "it is at these early years of their adult lives they assume full responsibility for managing and directing their financial affairs" (Breitbach and Walstad, p 81).

Ehrlich and Guilbault, after reviewing over 100 resources, defined financial literacy as "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…" (Ehrlich and Guilbault, p 264). The authors also further characterize financial literacy as being measured through two primary perspectives: objective and subjective. Objectively-measured financial literacy refers to an individual's genuine familiarity with key financial topics encountered in daily life. Subjectively-measured financial literacy refers to an individual's perceived level of knowledge with financial concepts (Lu, p 48; Lind et al., p 627).

The low financial literacy levels among the youth paired with the increasing levels of debt raises a question: to what extent do grade levels and the requirement of an economics course in high school impact the financial literacy levels of students in the United States? This paper will augment existing research by analyzing the connections between subjective and objective financial literacy levels using different educational criteria. Analyzing these factors could shed light on more effective ways to positively influence young adults' future financial behaviors through the educational system.

Literature Review

Relationship Between Grade Levels/Age and Financial Literacy Levels

A study by Silva et al. surveyed over 4,000 high school students with the purpose of investigating how individual, social, and demographic factors affected their financial education levels. The researchers discovered that students in the upper grades exhibited higher financial literacy levels compared to students in the lower grades. They concluded that as there was "a maturing of students," they gained more financial knowledge, especially in the topic of financial planning (Silva et al, p 16). Similar to the findings of Silva et al., a study by Xiao and Chen affirmed the same conclusion. This study collected data from the 2012 National Financial Capability Study to conduct a correlational analysis between numerous financial capability variables, one of which was age. According to the data, the youngest age group had the "lowest financial literacy score while the oldest age group had the highest score" (Xiao and Chen, p 17). Even after adjusting for socio-demographic and financial factors, the research revealed that both objective and subjective financial literacy increased with age. Similarly, a study by Baihaqqy et al. investigated how the education level of investors influenced their financial understanding of financial literacy. Researchers collected data from questionnaires and conducted a descriptive and correlational analysis. They found a "significant correlation between the level of education of investors and an understanding of financial literacy." (Baihaqqy et al., p 312). Therefore, investors gained a better understanding of the topic as their education or grade level increased and, consequently, received more information.

Public School Financial Education Curriculum

According to the Organization for Economic Cooperation and Development, in the United States, many individuals are displaying poorer financial literacy levels and more problematic financial behaviors. Many are "overdrawing their current accounts, using credit cards expensively, or using high-cost borrowing methods" (OECD, p 10) Therefore, in response to this problem, a growing number of states are beginning to focus on incorporating financial education, such as personal finance or economics courses, into state requirements. Public schools are required to abide by a set curriculum guideline established by the state. Seven states, including Virginia, Alabama, Tennessee, Missouri, Utah, North Carolina and Mississippi, require students to take a "half-semester course that focuses on personal finance" (Reinicke). Over 20 other states have introduced such bills to be passed by the state legislature and signed into law. Furthermore, states such as California, Florida, and New York require high school students to take an economics course in order to graduate (Florida Department of Education; California Department of Education; New York State Education Department). Evidently, an increasing number of states are making a conscious effort to raise students' financial literacy levels through education in order to improve their financial behaviors as adults.

The Effects of Financial Education on Financial Literacy

Analyzing data from a national poll of students who finished the National Endowment for Financial Education's high school personal finance curriculum, Danes et al. discovered that a majority of the students' financial knowledge increased after participating in the classes and "a third of the students had increases in financial behaviors" (Danes et al., p 33). After engaging in the program, there was a notable gain in their financial knowledge and self-efficacy. Therefore, the study concluded that "teen financial literacy should be a priority on the education policy agenda." Likewise, a study by Simmons came to similar conclusions. The researcher conducted a financial literacy survey in order to measure the effects of personal finance courses and high school students' financial knowledge. Students who took the course scored a relatively high average of 14 questions correct out of the total 18 (Simmons, p 12). Consequently, the survey results, along with a regression analysis, determined that financial education demonstrates a positive correlation with students' financial literacy. Furthermore, a study by Nguyen assessed the effectiveness of a money management class for specifically high school seniors through both a pretest and a posttest. Although the number of respondents was small, the findings determined that financial literacy classes "increased students' financial literacy levels through financial socialization and effective experiential teaching techniques" (Nguyen, p 37). According to the researcher, these findings prompted the need for more financial education courses. It is evident that previous literature generally supports the notion that financial education in high school has a positive impact on students' financial literacy.

The Effects of Financial Education on Financial Behaviors

A study by Batty et al. investigated the impact of a finance curriculum implemented by the Council for Economic Education's Financial Fitness for Life organization for elementary school students. This program taught them about savings, financial decision-making skills, and the management of money. They surveyed fourth and fifth-grade students who participated in the course as this age group has "sufficient cognitive skills to respond accurately to the questions." The results concluded that financial education was directly correlated with financial behaviors. Not only that, but the team also discovered that the financial knowledge gains were long-lasting, persisting even after a year of the students' participation, thereby providing "encouraging evidence of the potential for financial education offered to elementary students" (Batty et al., p 87). As a result, this research suggests that financial education even at a young age could have long-term impacts on future savings and their general financial health as they become adults. Batty et al. stated that financial courses should not substitute for math classes. However, it could be beneficial to incorporate financial topics into existing courses.

Conversely, a study by Wagner reported mixed results when researching the effects of financial education on financial behavior. Using data from the 2012 National Financial Capability Study, the researcher determined that "financial education may be less effective for short-term behaviors because people are able to learn about them through life experience and their understanding may depend less on formal instruction" (Wagner, p 3). Still, the team substantiated the findings that financial education has a positive relationship with long-term behaviors. They surmised that these behaviors are less vulnerable to learning by experience and may thus be affected by formal training.

A study by Bruhn et al. also revealed conflicting results. The researchers implemented a randomized controlled trial to determine the impact of financial education programs on high school students' financial literacy levels and behaviors. Schools that were placed in the treatment group received financial education resources and training, while schools that were placed in the control group did not receive such materials. To collect data, researchers sent questionnaires in order to gather related information from students. The results showed a nine percent "decrease in failure rates and significantly higher passing rates in treated schools compared to control schools." However, although students' financial proficiency increased, they were also "21 percent more likely to list monthly expenses in a budget and 4 percent more likely to negotiate prices when buying consumer products" (Bruhn et al., p 258). According to the researchers, one possible explanation for these findings is that teaching students to manage their finances made them

more aware of money, which, in turn, caused them to spend more. Furthermore, a study by Mandell and Klein surveyed graduates from three high schools with the same educational system. The results of the survey showed that "those who took the course were no more financially literate than those who did not take the course" (Mandell and Klein, p 18). Graduates who completed the class did not report themselves to have better financial behaviors. However, a limitation of the study includes the small sample size of 79 respondents. Furthermore, as the study surveyed students from one school system, the conclusions may not be generalizable.

Gap In Knowledge

A cursory examination of the current literature on financial literacy strongly suggests that there exists a stronger overall correlation between students' grade levels and their financial literacy levels. Furthermore, although there were mixed results as to whether financial education improved students' financial behaviors, many studies have concluded that financial education has a positive correlation with their financial knowledge. However, even with these studies, there is still a lack of research focusing on specifically the efficacy of high school financial education. Therefore, in order to ascertain the precise relationship between student's grade levels, along with their schools' requirements for an economics course, and their financial literacy levels, more pertinent research must be conducted.

If a relationship between these variables are identified, it will be crucial that they obtain a solid understanding of the subject at an early age as their gained knowledge will be put into practice once they become college students. After high school, most will begin to assume financial responsibility, such as managing their finances and paying various expenses. However, according to Archuleta et al., college students exhibit financial behaviors that are not sustainable long-term. Many students are inapt at budgeting and are prone to excessive spending (Archuleta et al., p 50). Therefore, in order to ultimately address the problem of poor financial behaviors among young adults, it may be beneficial to analyze the financial knowledge of high school students as they also display poor financial literacy levels.

Methods

Research Design

This study completed a correlational analysis using data from a survey that measured high school students' perceived and actual financial knowledge levels. The high school student's grade level and residential state acted as the independent variable while their financial literacy levels acted as the dependent variable. The results from the survey were first used to examine whether there was a correlation between high school students' perceived and actual financial literacy levels. They were then utilized to examine whether there was a correlation between high school students' grade levels and their financial knowledge. Lastly, the data was analyzed to determine whether there was a relationship between the requirement of an economics course in high school and students' financial literacy levels.

Population

The survey collected data from 9th, 10th, 11th, and 12th grade students as their age range falls in the targeted teenage demographic of 14-18 years old. The survey received responses from high school students in four different states: California, Florida, New York, and Washington. Students from both private and public schools participated in the survey, and they were recruited through an email that a third-party assistant sent with the survey attached. The students received this email after their parents signed a consent form. Furthermore, before the survey was sent out, an Institutional Review Board authorized it to protect the safety of the participants. To guarantee that responses could not be traced to specific people and to avoid bias within the responses, the survey was anonymous. Respondents could close the survey at any point if they desired to opt out, and the results were not submitted until they sent them.

Instruments

To collect primary data, the survey was conducted using Google Forms, a free tool that enables for the collection of data. Respondents could no longer repeat the survey after it was finished to avoid multiple replies that could affect the results. To analyze and manage the survey data, the researcher used Jupyter Notebook, an online web tool that allows individuals to plot and explore data using codes, equations, and computational outputs.

Survey Implementation Details

A 10-minute online survey was used to measure high school students' financial literacy levels, and a total of 129 students responded to the survey. To begin, it asked for each student's age, grade levels, whether they attended a private or public school, and the state in which they resided in. Next, in order to most accurately and effectively evaluate students' financial literacy levels, the survey employed identical or similar questions from existing research studies (Breitbach & Walstad, p 86; Meyers, p 12; Robb & Woodyard, p 63). When assessing students' perceived financial knowledge, answers to these three questions were on a six-point Likert-scale, allowing respondents to select the option that best represented their views. This rating scale was frequently used to answer questions and statements in a number of studies that subjectively measured individuals' financial knowledge (LaBorde et al., p 5; Nonis et al., p 28). Conversely, when assessing students' actual financial knowledge, answers to these five questions were true or false or multiple choice. These questions objectively measured students' knowledge about employment and income, risk management and insurance, credit and debt, and investing. Questions measuring perceived and actual financial literacy levels were separated into two different sections. This prevented respondents' replies in one section from being influenced by questions in the other and ensured that the responses reflected the respondents' true financial literacy levels.

Data Analysis

Due to the many variables and questions that needed to be examined, the data from the survey was imported onto a Python script that was constructed via Jupyter Notebook to perform basic data analysis. The script used Numpy, Pandas, and Sklearn packages via the Data Science module to perform the analysis. These packages are Python libraries used for numerical computations. In addition, Matplotlib Library was used for processing and visualizing the survey.

Through implementing these data tools, a table was created with a row representing individual responses and a column representing answers to the questions asked. The numerical values of the subjective financial literacy questions were summed on an individual-basis, calculating a score based on the average of responses to each question and designating a score. After the arithmetic mean of the numerical values were calculated, they were stratified into three different groups according to the value of the mean: subjective low, subjective medium, and subjective high. Similarly, the objective measures of financial literacy scores were calculated with a student receiving one point for every question he or she answered correctly. The average of the number of questions they answered correctly were also calculated and stratified into three levels: objective low, objective medium, and objective high.

Table 1: Instruments

Questions	Measurement Scale	Source
Demographics	**Assorted**	
What grade are you in?	9th, 10th, 11th, 12th	Self-Defined
How old are you?	Open Response	
Actual Financial Literacy	**Assorted**	
A 15- year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.	True, False	Breitbach & Walstad
Buying a single company's stock usually provides a safer return than a stock mutual fund.	True, False	Breitbach & Walstad
You are considering investing to create a portfolio. To decrease the overall risk in your portfolio, would you purchase more or fewer assets to go in the portfolio?	More, Less	Meyers
Under most circumstances, unfavorable data on your credit report, such as filing for bankruptcy, will likely be removed from your file in:	5-7 years, 6-8 months, 7-10 years, Whenever the unfavorable data is resolved (i.e. repayment of debts that created unfavorable data)	Meyers
Does net income account for the deductions in monthly income from taxes?	Yes, No	Meyers
The only way to receive employment income is a paycheck.	True, False	Meyers
Self-Assessed Financial Confidence	**Likert Scale**	
I am pretty good at math.	Strongly Disagree (1)-Strongly Agree (6)	Robb & Woodyard
I regularly keep up with economic and financial news.	Strongly Disagree (1)-Strongly Agree (6)	Robb & Woodyard
How would you assess your overall financial knowledge?	Very Low (1)-Very High (6)	Robb & Woodyard

The results were then reorganized into a new dataframe, and basic Bayesian analysis was performed to determine if there was a correlation between a student's objective financial literacy levels and his or her subjective literacy levels. The findings were visualized as pie charts and scatter plots using the Matplotlib library.
The Pearson coefficient (r-correlation) was calculated to measure the strength of a linear connection between perceived and actual financial knowledge. Using the Sclearn Package, the r-squared factor was also measured to determine the proportion of variation between the two variables. In addition to determining whether there was a correlation between the two types of financial literacy levels, these exact steps were repeated to compare students' financial knowledge levels with regard to their grade level and residential state.

Discussion

Table 2: 12th Grade Subjective Financial Literacy Levels

Subjective	Count
Subjective High	8
Subjective Low	1
Subjective Middle	9

Table 3: 12th Grade Objective Financial Literacy Levels

Objective	Count
Objective High	8
Objective Low	1
Objective Middle	9

Table 4: 11th Grade Subjective Financial Literacy Levels

Subjective	Count
Subjective High	15
Subjective Low	7
Subjective Middle	37

Table 5: 11th Grade Objective Financial Literacy Levels

Objective	Count
Objective High	12
Objective Low	8
Objective Middle	39

Table 6: 10th Grade Subjective Financial Literacy Levels

Subjective	Count
Subjective High	7
Subjective Low	4
Subjective Middle	29

Table 7: 10th Grade Objective Financial Literacy Levels

Objective	Count
Objective High	12
Objective Low	5
Objective Middle	23

Table 8: 9th Grade Subjective Financial Literacy Levels

Subjective	Count
Subjective High	0
Subjective Low	0
Subjective Middle	12

Table 9: 9th Grade Objective Financial Literacy Levels

Objective	Count
Objective High	4
Objective Low	1
Objective Middle	7

Table 10: California Public School Students' Actual Financial Literacy Levels

Objective	Count
Objective High	13
Objective Low	3
Objective Middle	35

Table 11: Florida Public School Students' Actual Financial Literacy Levels

Objective	Count
Objective High	8
Objective Low	4
Objective Middle	13

Table 12: New York Public School Students' Actual Financial Literacy Levels

Objective	Count
Objective High	2
Objective Low	2
Objective Middle	9

Table 13: Washington Public School Students' Actual Financial Literacy Levels

Objective	Count
Objective High	0
Objective Low	2
Objective Middle	7

Table 14: Total Students' Subjective Financial Literacy Levels

Subjective	Count
Subjective High	30
Subjective Low	12
Subjective Middle	87

Table 15: Total Students' Objective Financial Literacy Levels

Objective	Count
Objective High	36
Objective Low	15
Objective Middle	78

Baseline Findings

Among the 129 students that responded to the survey, 90 students attended a public school. 51 students who responded to the survey were from California public schools. Among these students, 25.5% scored in the high range for their objective or actual financial literacy levels while 5.9% scored in the low range (Table 10). 25 of the responses were from students attending public schools in Florida. 32% of these students scored in the high range while 16% scored in the low range (Table 11). 13 students who responded to the survey were from public schools in New York. 15.4% of these students scored in the high range and, similarly, 15.4% also scored in the low range (Table 12). 9 students who responded to the survey attended public schools in Washington. Among these students, none scored in the high range while 22.2% scored in the low range (Table 13).

18 students who responded to the survey were in 12th grade. Out of these 18 students, 44.44% scored in the high category for their subjective financial literacy levels, and 44.44% also scored in the high category for their objective financial literacy levels (Table 2; Table 3). Only one 12th grade student scored in the low category for their subjective and objective levels. The Pearson correlation coefficient between their subjective and objective financial literacy levels was 0.566. As the coefficient demonstrates, 12th graders had the highest direct correlation between their objective and subjective literacy levels, meaning that as their subjective scores increased, their objective scores also increased. Furthermore, 59 students who responded to the survey were in 11th grade. Out of these 59 students, 25.42% scored in the high category for their subjective financial literacy levels, and 20.34% scored in the high category for their objective financial literacy levels (Table 4; Table 5). The Pearson correlation coefficient was 0.256. 11th graders also showed a positive direct correlation between their objective and subjective knowledge. However, the correlation levels were not as pronounced as those of 12 graders. The Pearson Coefficient for 11th grade was roughly 50% that of 12th grade at .256 compared to .566.

40 students who responded to the survey were in 10th grade. Out of these 40 students, 17.5% scored in the high category for their subjective financial literacy levels, and 30% scored in the high category for their objective financial literacy levels (Table 6; Table 7). The Pearson correlation coefficient was -2.539e-17. 12 students who responded to the survey were in 9th grade. Out of these 12 students, 100% scored in the middle level category for their subjective financial literacy levels, and 58.44% scored in the middle level category for their objective financial literacy levels (Table 8; Table 9). 33.33% of 9th graders scored in the high category for their financial literacy levels. The Pearson correlation coefficient was -0.053. Although 10th graders showed a slightly higher positive correlation compared to that of 9th graders, the Pearson Coefficients for both grades were not high enough to warrant any statistical significance.

Limitations

The first limitation of the study concerns the size of the sample population. The study only received 129 responses from four states. The survey also received a disproportionately high number of responses from students attending public schools in California compared to responses from students attending public schools in New York, Florida, and Washington. Thus, the results from these three states may be subject to higher variance. Therefore, a repeated survey needs to be conducted to account for the difference in variance. Furthermore, over 50 responses were from students in 11th grade; however, each of the other grades received less than 20 responses. Therefore, the conclusions from this study are drawn from samples that do not proportionately represent the actual distribution of grades among highschool students in the United States.

Secondly, the survey was not able to use responses from private school students to specifically investigate whether the requirement of an economics course has a relationship with students' financial knowledge. This was due to the fact that private schools are not required to follow state guidelines, and the specific curriculums of their schools

were not provided in the survey. Therefore, the survey responses from private school students were only used to determine the correlation between students' grade levels and financial literacy levels.

Lastly, the purpose of this study was not to identify a cause-and-effect relationship between students' grade levels or their school's economic curriculum and their financial literacy levels. Rather, the study's goal was to identify a correlation or a linear relationship between the variables.

Conclusion

Despite its limitations, this study contributed valuable new insights into how high school students' grade levels and the requirement of an economics course could affect their financial literacy levels. Three out of the four states the survey received responses from require students in public schools to complete an economics course in order to graduate. These states include California, Florida, and New York. Conversely, Washington does not mandate public school students to take a finance or economics course (The Washington State Board of Education). According to the data from the study, at least 15% of the surveyed students who attended public schools in California, Florida, and New York scored in the high range for their actual financial literacy levels. Conversely, none of the surveyed students who attended public schools in Washington scored in the high range for their financial knowledge levels. Therefore, these results suggest that there is a positive correlation between the requirement of an economics course in public high schools and students' financial literacy levels. According to the data, schools that made these courses a prerequisite for graduation had a higher percentage of students who have greater financial knowledge levels. These conclusions support the findings of research from Danes et al and Nguyen as both studies suggested that financial education has a positive relationship with students' financial literacy levels. However, the study disagrees with the findings of Mandell and Klein who stated that students who took a finance "course were no more financially literate than those who did not take the course" (Mandell and Klein, p 18).

The Pearson correlation coefficient indicated that there is a trend of increased positive correlations between objective and subjective financial literacy levels among 12th and 11th-grade students. In contrast, a significant relationship could not be identified between 9th and 10th-grade students' literacy levels. This suggests that as students' ages or grades increase, they are more accurately able to assess their own financial knowledge levels. Furthermore, over 40% of 12th graders scored in the high range for their actual financial literacy levels. In comparison, around 30% of 9th graders scored in the high range. Therefore, the general upward trend suggests that as students' grade levels rise, their financial literacy levels also increase. The findings of this study corroborate those of Silvia et al. and Xiao and Chen's research. Similar to how these researchers discovered that as individuals become older, their financial literacy levels improve, the data from this study also suggests that there is a positive correlation between students' ages or grade levels and their financial knowledge.

Implications

The data reveals that students of upper-level grades displayed a stronger positive correlation between their objective and subjective financial literacy levels compared to students of lower level grades. More 12th graders also performed higher on the objectively measured financial literacy test. Accordingly, it could be argued that the reason behind this causal relationship is that the quality and amount of financial education differ at each grade. For instance, a California public school curriculum framework published by the Department of Education stated that "students first encounter economics as a separate course in the twelfth grade" (California Department of Education). Therefore, it might be reasonable to surmise that the students' correlation between their financial knowledge levels may increase as they gain more educational skills from their schools. Such a view would, however, require further exploration of the factors contributing to such disparities.

Furthermore, the findings showed that schools that made economic courses a graduation requirement had a larger percentage of students who had high financial literacy levels. This ultimately suggests that improving the quality and availability of financial education curricula such as economic courses may help increase students' knowledge on financial topics. Additionally, out of the total students surveyed, 72 percent scored in either the middle or low range for their actual financial literacy levels, while only around 27 percent of students scored in the high range (Table 15). As a result, given that the majority of the respondents did not receive a high score, these findings further emphasize the need for increased financial education among the youth.

Consequently, improving the youth's financial literacy levels may help improve their future financial behaviors. However, as students' financial habits were not the primary scope of the study, this would need to be investigated further.

Thematic Future Directions

Future directions in research could include surveying high school students from a greater number of states to gather more accurate and generalizable conclusions. Future researchers should also complete a factor analysis for the survey to reduce the variability of the questions asked using statistical models. This will yield a more accurate assessment of students' literacy levels.

Additionally, future studies should investigate whether there is a relationship between students' financial behaviors and financial knowledge in order to further ascertain whether resources should be allocated to education programs that enhance financial knowledge during primary education. If there is a strong correlation between financial knowledge and behavior, it might further prove the need for increased investment in increased financial education programs for younger students so that they may exhibit more financially responsible behaviors as adults.

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