

AN INVESTIGATION OF THE PERSONAL FINANCE CHARACTERISTICS OF GEN Z
IN SECONDARY EDUCATION PROGRAMS

by

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Abstract

The purpose of this research was to evaluate the financial characteristics, and personal finance behaviors of Appalachian State University students. Research indicates that college students are often unprepared for handling personal finances after graduating and lack a foundation of knowledge regarding personal finance concepts. This study was designed to evaluate the levels of personal finance knowledge of students and determine how prepared these students are to handle their own finances after graduating. This Thesis surveyed Walker College of Business students and Appalachian State University students to understand what level of knowledge and financial behaviors they possessed. The results indicate that Appalachian State University students compare similarly to the average U.S. adult in inadequate financial literacy levels and demonstrate behaviors that can be detrimental to securing financial security. This project provides insight into the existing personal finance education of college students as well as identifies opportunities in the existing general education system to address finance education and personal financial management behaviors of university students.

Introduction

Financial literacy in a time of economic uncertainty and challenges becomes more important to personal financial management and financial security. Instilling the principles of personal financial and retirement strategy early can help students live stress free and capable of flourishing in any economic condition. Yet, the average American adult is not financially literate, and struggles to answer simple conceptual questions. This suggests that many U.S. citizens from all types of backgrounds are not exposed to a sound base of knowledge that could help them navigate changing economic conditions and live without stress due to undisciplined behaviors with their resources. What if students aren't being exposed to a basic but highly necessary form of personal financial education? With this question in mind, I set out to discover how Appalachian State students compare to the average U.S. adult regarding financial literacy, and if they felt behaviorally prepared for handling their money after graduating.

Literature around student financial literacy suggests that students are underprepared, stressed about finances, and concerned about retirement planning, which even at an early age is important to consider. Previous research suggests college students struggle to correctly answer financial literacy questions, and express concerns about their financial situation and preparedness, with this in mind, my research focuses on developing an understanding of how Appalachian State university students compare to the average U.S. adult and how students behave in their individual financial situations.

Using a hand-constructed survey, I sample 47 students and find that Appalachian State University students demonstrate low levels of financial literacy and experience stress and a feeling of being unprepared to handle their own personal financial situation after

graduating. The results of the survey closely compare with results from past studies of financial literature and reflect that the average adult has inadequate levels of financial literacy that could be an obstacle to financial well-being and retirement preparedness. The rest of the paper is organized as follows: I discuss the literature, followed by my methodology and results, and finally, I conclude.

Literature Review

Previous studies on student financial literacy are numerous and research many different groups of subjects and the factors that influence student financial literacy. These studies often focus on background, the course of study, gender and age, while presenting participants with basic conceptual questions about personal finance. The main conclusion from almost every study is that students are vastly underprepared for managing personal wealth. In most studies, students were able to answer less than half of the prompted questions.

Financial Literacy

In 2015, online multimedia financial services company The Motley Fool posted an online article discussing a set of three financial concept questions that originated from a study in 2004 from researchers Olivia Mitchell and Annamaria Lusardi who were conducting studies on the retirement knowledge of different age groups. In June 2018 the New York Post published an online article that discussed a survey by Wells Fargo that used these same questions which studied American adults separated into two categories; millennials and boomers. This survey found that 51% of millennials could not correctly answer the questions, and two thirds of boomers failed to answer correctly (Hiil, 2018). Similarly, these questions were discussed in a 2017 article published by CNBC which used the results from Lusardi and Mitchell's original survey to discuss the financial illiteracy of American adults (Elkins, 2017). These articles represent a growing concern over the current levels of financial literacy that American adults possess. They also represent the effort of mainstream media to communicate these very serious issues to the general public to help raise awareness of this social issue, and how this can impact the ability of working adults to prepare for retirement.

The results of these studies showed that when these questions were given to American adults, the majority could not correctly answer all three correctly. Participants were separated into different groups, such as which generation they belonged to, sex, and education level, all with similar results of being unable to correctly answering the survey questions (Mitchell & Lusardi, 2004). In a separate study, by Tabea Bucher-Koenen, Annamaria Lusardi, Rob Alessie and Maarten van Rooij in 2014, the authors studied the gender gap in financial literacy. The same three questions which originally came from Olivia Mitchell and Annamaria Lusardi, were used to study groups separated into age, male, female, and marital status.

Half of participants could answer two out of three and less than a third could answer all three questions correctly. When these questions were given to Americans with college education, 55% of them did not get all three questions correct (Maranjian, 2015). The majority of college students from around the nation being unable to answer basic questions about interest rates, inflation and market risk suggests that students in secondary education programs are not receiving education in these topics and will not be ready to plan for their own retirements, or manage their wealth as they leave their undergraduate programs of study.

Prior studies on high school and college students suggest that students are not receiving significant education in personal finance which results in them not being able to answer questions about basic financial concepts. For example, research by Haiyang Chen and Ronald Volpe (1998) was focused on a questionnaire to 924 college students. The survey asked questions about their demographic information, personal finance knowledge, investments and decisions and behaviors about personal wealth management. The investigators concluded, “The overall mean percentage of correct scores is 52.87%,”

indicating on average the participants answered only about half of the survey questions correctly. The median percentage of correct scores is 55.56%. The reliability of the 36-question survey is 0.85. The large Cronbach alpha indicates that the questionnaire is reliable, which further increases its validity. The findings suggest that college students' knowledge on personal finance is inadequate” (Chen & Volpe, 1998).

The findings from this study are frequently confirmed by other studies on the financial literacy and behaviors of students in secondary education. In research by Brenda, J. Cude, Frances C. Lawrence, Angela C. Lyons, Kaci Metzger, Emily LeJeune, and Loren Marks, (2006), the study measured the financial understanding of university students. Through surveying a total of 1,891 students from Louisiana State University and the University of Georgia, the authors found that the average responses indicated that most of their participants had poor financial management skills and behaviors (Cude et al. 2006). The common theme of students being unable to answer more than half of financial literacy questions given to them suggests that there is a gap in the knowledge and ability of students to handle their personal finances and wealth.

Gender

The influence of gender on financial literacy is a frequently studied phenomena which has resulted in many interesting studies. A study that investigated first generation female college students and their financial literacy concluded that when given a survey related to personal finance questions and behaviors, these students answered an average of 58% of the questions correctly. This led the researchers to conclude that the personal finance knowledge of these students was inadequate (Eitel & Martin, 2009).

It is also becoming apparent in current research that women are showing lower

financial literacy scores because of non-cognitive factors such as self-confidence, persistence, and motivation, which can be contributing factors in the gender gap in financial literacy and earnings (Arellano et al., 2018). When surveying the financial literacy of women around the world, a study by Bucher-Koenen et al. (2014) found strong evidence to support that there is a significant gender gap in financial knowledge, especially related to methods and plans for retirement (Bucher-Koenen et al., 2014).

Cognitive Ability and Its Influence on Financial Literacy

Personal financial decision making is often influenced by intuitive decisions that are incorrect. In a study by Thoma et al. (2015), researchers explored the ideas of deliberate cognitive decision making versus intuitive decision making in finance professionals and non-finance professionals and found, “Results indicate that compared to non-expert participants financial traders have a higher self-rated tendency for reflective thinking and a greater propensity to inhibit the use of mental shortcuts (heuristics) in decision-making” (Thoma et al., 2015). While this research did not focus on students, it demonstrates the emerging research into the approach individuals take when making decisions about finances. In this research, a comparison is made between making deliberate, thought out decisions and making quick decisions based on intuition. The first system of decision-making focuses on using logic and rational thinking and deliberate consideration of available information and analytics to make decisions regarding investment decisions. Whereas the second system utilizes intuition, or a thinking process of immediate reaction based emotional stimuli, often an unconscious but immediate reaction and decision-making method (Thoma et al, 2015). The results of the study Good Thinking or Gut Feeling? Cognitive Reflection and Intuition in Traders, Bankers and Financial Non-Experts by Volker Thoma, White, E., Panigrahi, A.,

Strowger, V., & Anderson, I. (2015) suggests that there is a significant difference in the results between these two styles.

Contribution to the Literature

This lack of education is incredibly significant as recent studies suggest that students are not prepared for handling their personal finances after school. This is important because with today's availability of financial mobile technologies, more people are independently managing their money. However, they are not ready to make important decisions on how to best manage their financial resources, prepare for retirement or cope with the challenge and stress of handling personal finances which commonly affects college students (Gutter, 2011).

The questions to be used in this research largely come from past approved surveys on the financial literacy of college students. The three questions featured in the Motley Fool article come from a study from the Wharton School of Business at the University of Pennsylvania (Mitchell & Lusardi, 2004). Additionally, other previously approved studies that investigated the financial behaviors of students and American adults with an undergraduate degree are utilized to form questions. This research is using these questions to investigate the financial literacy and behaviors of Appalachian State University students.

This study is important because investigating the financial behaviors and financial literacy of Appalachian State students can help us to evaluate what current education levels are for college students. This study will also potentially identify new opportunities to improve the financial education of Appalachian State University students to better help them to become prepared for informed decision making and instill behaviors for managing their personal finances effectively.

Methodology

This study uses a comprehensive survey that covers personal finance topics, student financial behaviors, and questions that test cognitive deliberation when answering questions. Data was collected between October and December of 2019, with participants being limited to those at least 18 years old and currently enrolled at Appalachian State University in all disciplines. Participants were recruited through email in cohorts of business students, general education classes, and online postings through Appalachian State University Honors college announcements. This was designed to capture as many unique disciplines as possible as these groups contained a multitude of different majors.

The survey asked thirty-five questions that contained four free response questions that established the age, gender, and major of participants and included a last question that asked what students wanted to learn more about. The survey also contained thirty-one multiple choice questions that are broken down into the following categories: fourteen questions on basic financial concepts, three cognitive thinking questions, and twelve behavioral questions to determine how students manage and understand their own personal finance situation. These questions were developed in previously published research studies on financial literacy and some created by the principal investigator and the assisting faculty advisors of this study. Questions one through four are generic questions that help separate the anonymous responses into different categories of age, gender, major and which year of school the student was in. These questions serve to establish a base of how to categorize the responses and identify, if any, which group might be underrepresented in financial literacy. Questions five, six and seven are the core conceptual questions that were developed in Olivia Mitchell and Annamaria Lusardi's 2004 financial literacy survey which measured the financial knowledge

of adults which found most could not answer all three correctly. These questions and what they suggest above American financial literacy levels serve as the driving conceptual questions posed to Appalachian State University students to evaluate their understanding of basic finance concepts.

The next segment of the survey questions eight, nine and ten are uniquely designed to test the cognitive reflection of survey participants. These questions are designed to test how participants react to a problem and how they process the information provided. The next part of the survey, questions eleven to twenty-one, focuses on the characteristics of the participants and their knowledge of personal finance and retirement concepts. These questions were developed by the principal investigator and the faculty advisors.

The last segment of the survey, questions twenty-two to thirty-three, measures the financial behaviors of Appalachian State students and how they view their own personal finance situation. These questions were created in a financial survey by Brenda, J. Cude, Frances C. Lawrence, Angela C. Lyons, Kaci Metzger, Emily LeJeune, and Loren Marks, (2006) which surveyed college students at the University of Georgia and Louisiana state University about their knowledge of personal finance and their behavior in managing their own finances. The last question of the survey is a free response question that enables the student to freely express what other areas of finance or behaviors that they are curious about, or lack knowledge of.

This study has obtained Institutional Review Board approval from Appalachian State University and all responses were aggregated and kept anonymous in order to protect the identities of all participants and to encourage honest responses. The answers from each participant are used to calculate means for each question and a total mean of correct

responses for the entire survey for the financial concept questions. The behavioral questions had available answers of Strongly Disagree, Disagree, Neither Agree or Disagree, Agree and Strongly Agree as a response to provided scenarios and behaviors, the responses are calculated into means for this section as well.

Results and Analysis

This survey was sent out to an estimated 1,000 students attending Appalachian State University in multiple disciplines. The survey response rate was approximately 4.7%. The education of the population was heavily concentrated in business majors who represented 50% of the responses, while science represented approximately 15% of the sample, communications 10%, and humanities 8%. The education levels represented were 31.91% of respondents were seniors, 44.68% were juniors, 17.02% were sophomores, and 6.38% were freshmen. Most of the population of respondents were females, representing 78.7% of the respondent population. The average time taken to answer all 35 questions was 8 minutes and 43 seconds.

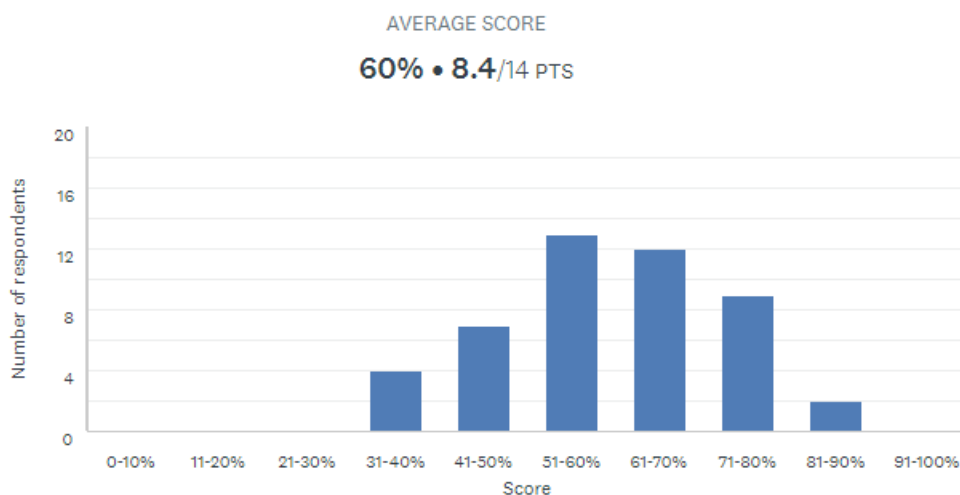
Table 1: Student Class Population

Class	# of Responses	% of Responses
Freshmen	3	6.38%
Sophomore	8	17.02%
Junior	21	44.68%
Senior	15	31.91%

General Results

With a total of 47 responses the average quiz score was 8.4 out of 14 points, resulting in a 60% average score. The highest score was 86%, the median score was 57%, the lowest score was 36%, and the standard deviation was 13%.

Table 2: Average Score of Survey Participants



Results suggest that the surveyed students, while aware of some financial concepts, lack a detailed understanding of the core ideas behind personal finance, retirement planning and questions reflection. These results repeat the nationwide trend of finance survey respondents only being able to answer two thirds or less of the questions.

Table 3: Breakdown of the Three Major Question Categories

Sections	Average Score
Repeat of Three Commonly Asked Finance Questions	91.33%
All Finance	48.88%
Cognitive Reflection	49.67%

The questions of the survey can be broken down into three major sections, the first section is the three commonly asked personal finance questions that originated from a 2004 research survey on the retirement preparedness and knowledge of American citizens by

researchers Olivia Mitchell and Annamaria Lusardi. These financial principles questions have fueled many surveys and articles in popular multimedia news outlets including The Motley Fool, The New York Post, and CNBC, regarding the financial literacy of American citizens. Additionally, they have also prompted additional research in financial literacy in peer reviewed articles by Tabea Bucher-Koenen, Annamaria Lusardi, Rob Alessie and Maarten van Rooij in 2014. The second section are the remaining finance questions in the survey that covered topics such as retirement strategies, personal finance, and insurance decisions. The last graded section of the survey was the cognitive reflection questions. Table 3 shows the breakdown in each section with average scores.

In the first section participants scored highly with most participants being able to correctly answer these questions with an average score of 91.33%. This score demonstrates that most participants had little difficulty in answering these questions with. For the second section of general finance questions the average score dropped significantly to 48.88%. These questions were more specific than the three repeated questions which were more conceptual. These results suggest that these educated participants had an intuitive understanding or access to these basic financial concepts through classes but when it comes to specific questions regarding retirement plans, insurance options or personal finance concepts, they were unable to answer them correctly. In the last section of cognitive reflection questions, the average score was 49.76% indicating a difficult section. This, along with a fast average time taken to complete the survey, suggests that questions may not have been thought through or carefully considered before an answer was quickly chosen.

The repeated financial concept questions had the highest average score and were often answered correctly by survey takers. Whereas the more specific and personal finance

related questions were the most difficult for participants to answer correctly with an average score below 50%. The cognitive reflection section also posted an average score of less than 50%.

Major

The responses were grouped into different majors and grouped together based on discipline. The highest number of reported majors were Finance and Risk Management & Insurance majors with 12 responses, with an average score of 69.8% which exceeded the average score by 9.8%. The outliers for the average score by discipline were mathematics majors which with 3 responses averaged a score of 91% and Education and Psychology majors with 2 responses with an average score of 9% and 3 responses for an average score of 37%, respectively. For a broken-down field of major groups and average scores see Table 4.

Table 4: Major Population of Participants and Scores per Major Category

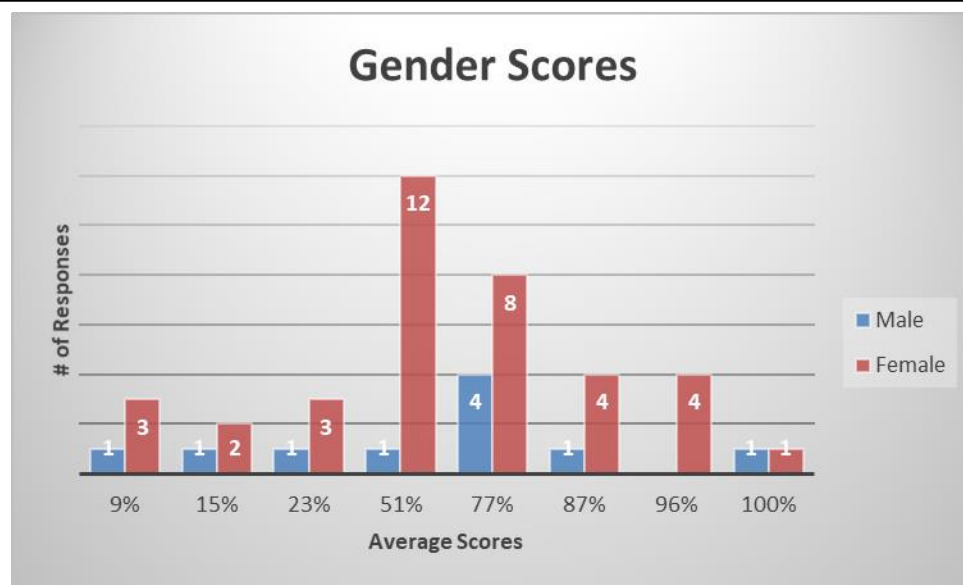
Majors	Average Repeat Score	Average Cognitive Score	Average Personal Finance Score	Average Total # of Score	# of Responses	% of Majors in Sample
Mathematics	88.89%	100.00%	54.17%	71.43%	3	6.38%
Marketing	100.00%	83.33%	50.00%	67.86%	2	4.26%
Finance & RMI	94.44%	50.00%	51.04%	60.12%	12	25.53%
Biology	100.00%	75.00%	37.50%	58.93%	4	8.51%
History, secondary education	100.00%	66.67%	37.50%	57.14%	1	2.13%
Accounting	100.00%	33.33%	43.75%	53.57%	2	4.26%
Communication Studies	91.67%	58.33%	31.25%	50.00%	4	8.51%
Health Sciences	88.89%	44.44%	33.33%	47.62%	3	6.38%
Anthropology and Spanish	66.67%	100.00%	12.50%	42.86%	1	2.13%
International business	66.67%	0.00%	50.00%	42.86%	1	2.13%
Music industry studies	100.00%	66.67%	12.50%	42.86%	1	2.13%
Management	87.50%	20.83%	32.81%	7.14%	8	17.02%
Education	100.00%	16.67%	12.50%	7.14%	2	4.26%
Psychology	77.78%	33.33%	12.50%	7.14%	3	6.38%

These results suggest that some majors, more than others, better understand financial concepts or have exposure to the correct answers. However, the limited responses for most of the major categories means they may not represent the typical population of those majors in financial literacy.

Gender

While 37 out of 47 responses identify as female, the performance results between male and female students are almost equal. The average female score being 59.1% and the male average being 59.3%. However, this can be attributed to the uneven level of responses. When looking at the scores for each gender in Table 5, the actual performance of each group becomes clearer. Table 5 shows the frequency of scores for each gender and while there are significantly more responses for the female group, the scores for both groups follow similar trends.

Table 5: Gender Population



With the average score being so low, the results suggest that most survey participants are lacking in the basic financial knowledge to correctly answer questions. The results of this survey for each gender appear to follow the same tract. However, additional research is required with additional male participants to see if the trend would strengthen or if there would be significant differences in the results.

Age

The age of the survey participants was mostly made up of 20 and 21-year old's with an average age of 20.6, with a few outliers aged 31 and 18. Figure 5 details the distribution of the age range of survey participants and table 6 shows the age population of participants, and table 7 shows the average scores for each age group. The most common age groups of 20 and 21 posted scores close to the average survey score at 60.5% and 62.4%, respectively. This figure also demonstrates a strong trend of the score increasing as the age of the survey participant increases. This indicates that at a young age student are not being exposed to the right financial education but as they get older and gain more experience, they come by this education in informal ways.

Table 6: Population Age and Number of Responses

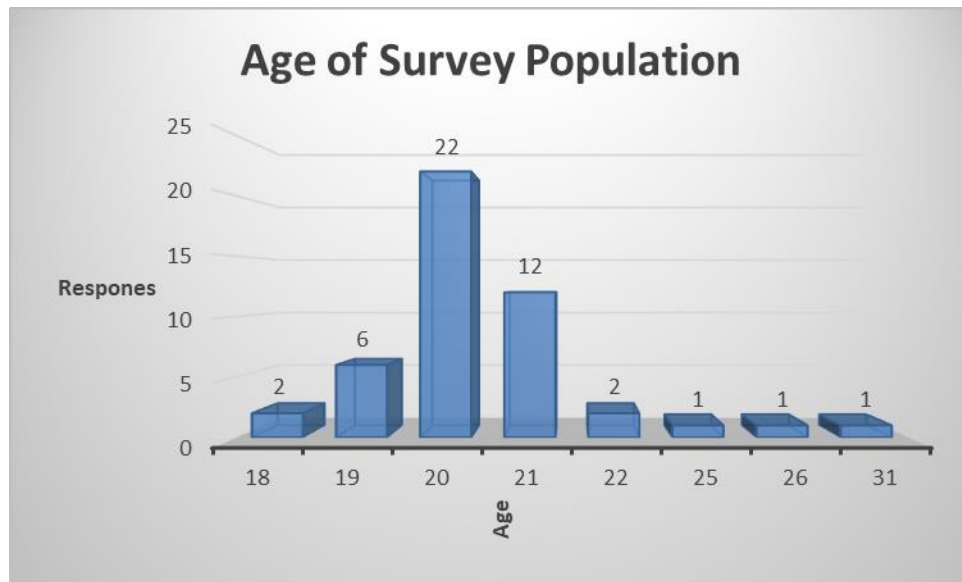


Table 7: Average Score for each Age

Age	Average Score	# of Responses
18	12.0%	2
19	58.2%	6
20	60.5%	22
21	62.4%	12
22	55.0%	2
25	51.0%	1
26	77.0%	1
31	87.0%	1

Class

Class results show that the juniors who took the survey had the highest average score of 69.2% with seniors scoring second highest on average with 62.7%. Sophomores had an average score of 42.4% and freshmen had a 15.7% average. Figure 7 details the average

scores for each class as well as the number of responses for each class.

<i>Table 8: Participant Education Class and Scores</i>				
Class	# of Responses	% of Responses	Average Score	
Freshmen	3	6.38%	15.67%	
Sophomore	8	17.02%	42.38%	
Junior	21	44.68%	69.19%	
Senior	15	31.91%	62.67%	

All Finance Results

The general finance questions section of the survey focused on personal finance concepts, especially geared towards retirement planning and home owning. The results of this section suggest that students can answer questions that have very intuitive answers, but when it comes to specifically asking how a retirement plan works, or how retirement plans differ they do not know the answer. The questions that were about what impacts stock prices, what is considered an excellent credit score, and how much of a budget should ideally be used to pay a mortgage all had high average scores, which means on average most of the students were able to correctly answer those questions. The question that had the lowest correct response rate was the question that asked what percentage of a down payment is required to prevent a bank from requiring private mortgage insurance, which only 53% of participants answered correctly. The question asking how does a 401(k) differ from a pension plan was only answered correctly by 17% of responses. This along with the question asking what tax advantage a Roth IRA provides, which was correctly answered by 32% of participants, suggest that survey takers are not familiar with specific retirement accounts or strategies. A list of the questions and scores for each of the survey questions in the finance section can be

seen in Table 9.

<i>Table 9: All Finance Question Results</i>	
Questions	Average Score
What percent down payment is required to prevent a bank from requiring private mortgage insurance?	53%
How does a 401(k) differ from a pension plan?	17%
What tax advantage does a Roth IRA provide?	32%
Which credit score is considered good/excellent	81%
Which of the following events would impact a company's stock price?	83%
How much of your monthly gross income should be used to pay your mortgage?	70%
Karen Minson, a North Carolina homeowner, has purchased homeowners insurance annually for the past 22 years. The main purpose of the insurance is that it pays for repair or reconstruction of the home in the event that fire, wind or some other unexpected peril damages or destroys it. Her home is her largest financial asset, and would cost \$350,000 to rebuild today, but Ms. Minson has never had a loss or filed an insurance claim in 22 years. This year the insurance premium for full coverage will exceed \$1,000, which is a lot of money for Karen, and she wonders whether the continued purchase is worth the cost. What advice do you offer to her?	74%

Survey Results on Financial Behaviors

The behavior section of the survey asked students questions about how they managed several personal financial decisions. The results of the behavior section of the survey resulted in a few interesting findings. Most students responded that they paid their credit card bills on

time each month and indicated they understood the concept of how credit cards work. The results also indicate that students are disciplined and utilize budgets to maintain control over their finances. In fact, only 36.90% said they have some level of difficulty in managing their personal money. However, the students reported that university classes had not prepared them for success in managing their finances with only 22.1% of responses saying they felt their classes had prepared them for handling their finances and 55% of responses said they are not relaxed about finances and experience some measure of anxiety regarding their personal financial situation. While students indicated they understood how credit cards work and used financial planning to keep to a budget, responses to questions that asked students about taxes, retirement strategies or the details of repaying student loans overwhelmingly indicated that students felt concerned or did not know anything about these concepts. These responses suggest that there are areas of personal finance that students are not being educated in or prepared to handle. For a more detailed view of the questions and breakdown of student responses see Table 10.

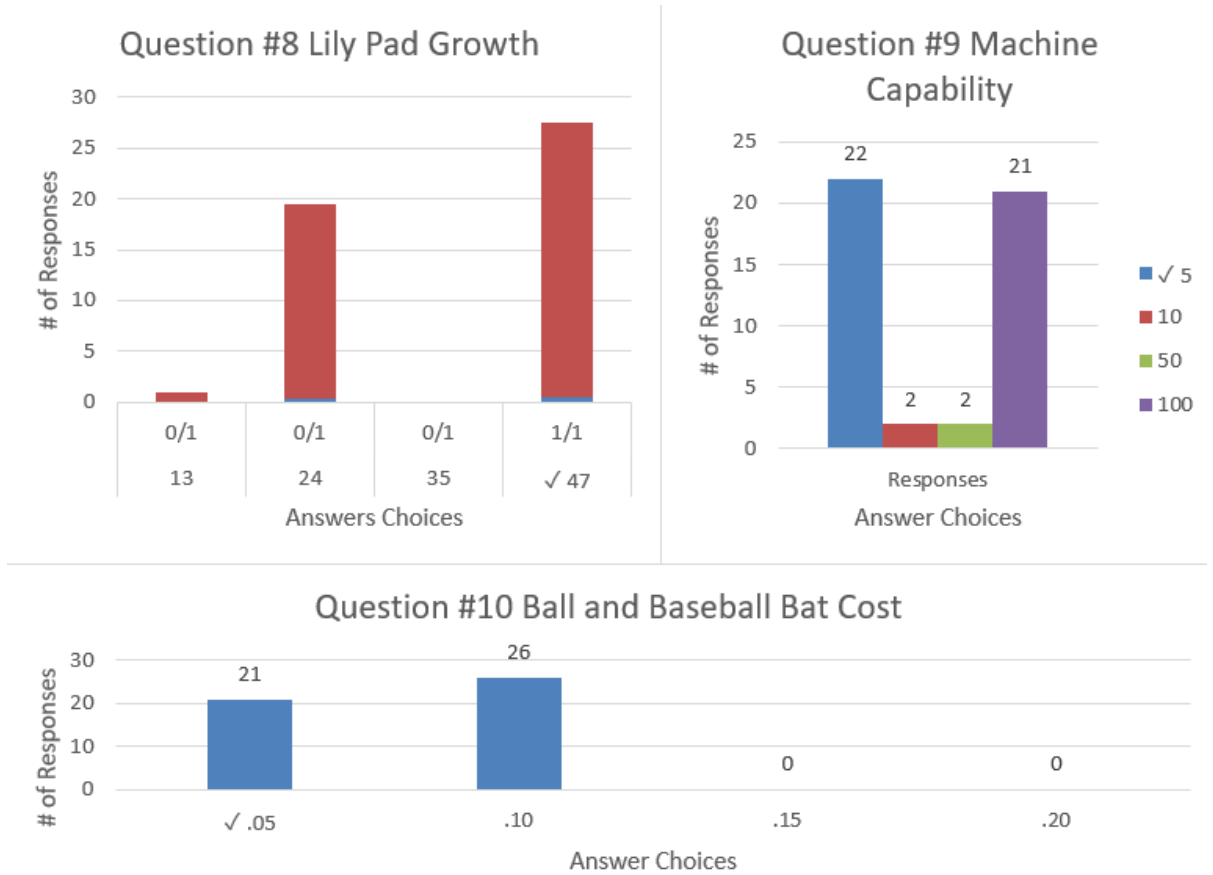
Table 10: Behavioral Finance Question Responses

Behavioral Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I pay my credit card bills on time each month.	48.94%	19.15%	31.91%	0.00%	0.00%
I avoid spending more money than I have.	53.19%	31.91%	6.38%	8.51%	0.00%
I pay my credit card bills in full each month.	39.13%	10.87%	41.30%	6.52%	2.17%
I stick to a weekly (or monthly) budget.	15.22%	39.13%	17.39%	17.39%	10.87%
I set aside money each month for savings.	20.00%	33.33%	17.78%	20.00%	8.89%
I have no difficulty managing my money.	19.15%	31.91%	14.89%	27.66%	6.38%
My college courses have helped prepare me to handle my personal finances after I graduate.	8.51%	12.77%	25.53%	29.79%	23.40%
I am relaxed about my finances.	4.26%	27.66%	12.77%	48.94%	6.38%
I know how to do my taxes.	2.13%	25.53%	8.51%	25.53%	38.30%
I understand the basics of how a credit card works.	36.17%	48.94%	4.26%	8.51%	2.13%
I know the types of student loans I have.	34.78%	19.57%	26.09%	17.39%	2.17%
I understand the details of the repayment requirements on my student loans.	19.57%	28.26%	34.78%	15.22%	2.17%

Cognitive Reflection

The average time survey participants took to complete the survey was 8 minutes and 43 seconds, which breaks down into approximately 22 seconds taken for each question. While the survey questions are straight forward in nature this extremely rapid response time suggests students would not take much time in deliberating each question before selecting an answer. With this in mind, a few questions in the survey were designed to have two styles of possible answers, a quick easy one that would seem correct when time was not taken to consider the questions, and a correct answer that is straightforward but requires some thinking through. A breakdown of the results for the three cognitive questions follow:

Table 11: Cognitive Reflection Question Results



Cognitive reflection was first evaluated using the Lily Pad question which is as follows; *In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?* of which 57.45% of responses selected the correct answer of 47. The correct approach to solving this problem is realizing that lily coverage of the lake is the time it takes to completely cover the lake minus one day which means if it takes 48 days to completely cover the lake then it takes 47 days for the lake to be half way covered. The common mistake here is that participants will divide the 48 by 2 to get to the answer 24 which is a common

and easy mistake to make when quickly deciding on the question before considering it.

For question #9, which is written as, *if it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? ____ minutes*, the correct answer is 5 which 46.81% of participants managed to answer correctly, whereas 44.68% answered the wrong but appealing answer of 100. With around 8% divided between the other two incorrect answers. To get the answer correct is a matter of realizing that the length of time wouldn't change because increasing the number of machines but keeping the number of units each machine is producing steady results in the answer remaining 5. The common mistake on this question is the participant focusing on the initial information and assuming that the 5/5/5 ratio will be the same for 100/100/100 which leads to the highly selected but incorrect answer of 100.

The final cognitive reflection question which asked, *A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?* was correctly answered by 44.68% of respondents. To solve this problem the math is:

$$\text{\$1.10 Bat \& Ball Cost} = \text{Ball Cost} + \text{Ball Cost} + \text{\$1.00}$$

$$\text{\$1.10} = \text{X} + \text{X} + \text{\$1.00}$$

$$2\text{X} = \text{\$1.10} - \text{\$1.00}$$

$$2\text{X} = \text{\$.10}$$

$$\text{X} = \text{\$.05 or 5 cents}$$

This question is commonly missed because participants often see the problem as \$1.10 cost of ball and the bat = cost of ball + the \$1.00 cost of the bat leaving the 10 cents as the cost of the ball. The cognitive reflection questions were only answered correctly by about 44% of participants which when paired with the quick survey response time suggests that

survey takers were not taking the time to read, reflect on, and then answer questions on this survey. But that survey takers may be relying on their ability to quickly process information and choose an answer based on which piece of information the participant registers with first.

Correlation

To understand the relation between financial behaviors and the average scores of the survey we created a correlation table that compared these factors to average score. Using an ordinal scale, each answer was assigned a number to identify it when calculating the correlation coefficients between those categories and the average scores of each participant. The scale used was based on “Strongly agree” being equivalent to 5 and “Strongly disagree” being equivalent to 1.

The highlights of this analysis demonstrate that there are positive correlations between financial behaviors that suggest good financial decision making with feelings of well-being or optimism about the participant’s financial position. The strongest correlation is the relationship between the behavior, “I pay my credit card bills on time each month” to the behavior of, “I avoid spending more money than I have,” which suggests that those who avoid excess spending typically have a better ability to pay their bills on schedule and avoid late fees. A relationship that is particularly interesting is the 0.48 positive correlation coefficient between knowing how to do taxes and agreeing that college courses have prepared students for handling finances after graduation. This is important because it helps show that college courses are a great source of exposure to financial literacy, but an overwhelming number of students answered that their courses had not prepared them. This demonstrates a potential opportunity for creating new course or degree requirements that can

help educate students and provide them with the tools for financial well-being after graduating. These results also seem to suggest that whether students practice sound financial behaviors, there is a relation between stress about financial well-being and the financial behaviors that are not “desirable” decisions when handling personal finances. There is a strong relationship (correlation coefficient of 0.8522) between participants knowing the type of student loans they carry and the details of paying back those loans.

One of the most interesting and meaningful correlations from the analysis is the 0.5101 correlation coefficient observed between participants paying their credit card bills on time and the personal finance section score. This indicates a moderately positive relationship between healthy financial decision making and financial literacy. The connection between sound financial decision making and financial literacy is also supported by a 0.5099 correlation coefficient between sticking to a budget and setting aside money every month. This establishes that the participants who made desirable financial decisions also tended to state they knew how similarly related concepts worked. This is illustrated by the correlation between understanding the basics of credit cards with knowing the type of student loans a participant had (0.5269 correlation coefficient) and also with understanding student loan details (0.5099 correlation coefficient). This supports the idea that the understanding of important financial concepts combined with desirable financial decision making are linked with greater understanding in other areas of personal finance as well. Table 12 shows the results of the correlation analysis.

Table 12: Correlation Analysis of Financial Behaviors

Correlation Analysis	I pay my credit card bills on time	I avoid spending more money than I have	I pay my credit card bills in full	I stick to a budget	I set aside money each month	I have no difficulty managing money.	My college courses have prepared me to handle my personal finances	I am relaxed about finances.	I know how to do my taxes.	I understand the basics of how a credit card works.	I know the types of student loans I have.	I understand the details of the requirements on my student loans.	Repeat Score	Cognitive Reflection Score	Total Personal Finance Score	
I pay my credit card bills on time	1															
I avoid spending more money than I have.	0.959761263	1														
I pay my credit card bills in full	-0.05061311	-0.079933908	1													
I stick to a budget.	0.045687954	-0.004581502	0.199224	1												
I set aside money each month	0.232741637	0.188594955	0.221524	0.5099	1											
I have no difficulty managing money	-0.06271792	0.066955226	0.252313	0.2812	0.2427742	1										
My college courses have prepared me to handle my personal finances	0.026709843	0.008173776	0.133308	0.1421	0.126494	0.010521923	1									
I am relaxed about finances.	-0.31473482	-0.300345397	0.302418	0.0622	0.2974117	0.250838154	0.187394417	1								
I know how to do my taxes	-0.02993058	-0.038594694	0.10424	0.2902	0.141661	-0.02229708	0.483951514	0.11584743	1							
I understand the basics of how a credit card works	-0.20900801	-0.252915301	0.219702	0.428	0.2979423	0.094962113	0.342107815	0.29165643	0.25957	1						
I know the types of student loans I have	0.010318934	-0.041562989	0.273214	0.1901	0.1465829	0.240784453	0.273884466	-0.0601951	0.1867	0.526962431	1					
I understand the details of the requirements on my student loans	0.062256908	0.046671552	0.291164	0.2206	0.2447969	0.213831111	0.350181611	0.12024962	0.3492	0.509901182	0.852226064	1				
Repeat Score	-0.01646268	0.008116663	0.06475	0.2777	0.1691645	0.385018314	0.255755312	0.1349986	0.32048	0.304840814	0.157840157	0.164515545	1			
Cognitive Reflection Score	0.032938247	0.015005082	0.132268	0.2711	0.1128296	-0.0705066	0.146510866	-0.2259899	0.28326	0.190362945	0.118195581	0.171178845	0.0784	1		
Total Personal Finance Score	0.510155589	0.432947234	-0.182778	0.078	0.1052813	-0.25124495	0.121539898	-0.1984879	0.14736	-0.001048249	0.087040826	0.08933622	-0.102	-0.086536	1	

Areas of Future Research

This study featured a small sample of participants that were students from Appalachian State University with a range of majors of which most were business majors with a heavy concentration of finance students. Given this, studying a wider population of students from all disciplines across Appalachian State would provide a better understanding of what a typical student knows about personal finance and their potential preparedness for handling financial resources after graduation, and eventual retirement. Additional studies on financial behavior, cognitive evaluation of problems, and problem solving would also be interesting to discover how students approach problem solving when concerning their own financial well-being.

Conclusion

In this small sample size of Appalachian State University students, the results mirrored results seen in past studies with a total average score of 60%. Students were able to answer better in categories such as the repeated finance concepts section, in which survey participants answered with an average score of 91.33%, compared to average results of about 66.6% or two thirds of adults in previous studies by Olivia Mitchell and Annamaria Lusardi in 2004. In the following sections though, participants demonstrated that students at Appalachian State are underprepared and have concerns about their ability to manage their personal finances and retirement planning after graduating. With the ongoing pandemic of Covid-19 and its disastrous impact on the world economy, the ability to manage personal finances and behaviors is becoming more important to secure financial security. However, the current economic conditions combined with the results of this survey suggest that students may not be prepared to effectively manage their finances or operate financially stress free.

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