

Bryant University

HONORS THESIS



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Implementing Universal Design for Learning in Financial Literacy Education
Honors Thesis for Andreas Kotsironis

ABSTRACT

The purpose of the study is to understand what students currently know regarding financial literacy, what learning style they use in the classroom, and how to fuse the two into a simple and informational version of financial literacy education. Financial literacy education can be used to increase household savings for retirement, personal financial goals, and risk management purposes. By joining the concept of UDL and Financial Literacy Education, each obstacle listed can be improved upon. Learning styles focus attention onto three different approaches to teaching that are based in auditory, visual, and kinesthetic pedagogies. UDL focuses on curating individual learning curriculum based on multiple means of engagement, representation, and action & expression. Both aim to foster the most effective form of student's learning. Focusing the research on financial literacy education can be achieved through in-depth analyses of past case studies and by conducting surveys amongst extreme users of financial services. In the study, sample questions are geared towards understanding an individual's proficiency of financial literacy, understanding their learning styles, and designing the most effective approach to teaching fundamentals of finance. Results suggest that fusing learning styles into financial literacy education contributes towards student comprehension of finances. Students utilize the visual approach most, which may be due to the increase in digitalization and overreliance on virtual devices.

INTRODUCTION

Financial education refers to the ability to understand and effectively manage personal finances. Although there are multiple definitions to financial literacy, researchers agree that young adults are significantly underprepared to manage their personal finances (Marcolin, 2006; Garg, 2018; Lusardi, 2010; Lusardi and Mitchell, 2023 ; Michaud, 2021). The integration of learning styles with financial education has the potential to make individual finances easier to understand, make it more accessible, and make it more engaging for users. This literature review will examine the relationship between learning styles, UDL, and financial education. A survey is utilized to measure a student's proficiency in financial literacy and to understand their preferred learning approach. Another survey is distributed to the same students that asks the same financial literacy questions in their preferred learning style to assess their progress.

Universal design is a concept that originated in architectural design. It aims to create accessibility structures to foster equity between people with disabilities and the able bodied. Regarding education, Universal Design for Learning (UDL) advocates for a special focus on three distinct facets that cultivate an atmosphere of understanding (Edyburn, 2005). Explained as three multiple means, they are principles for educators towards classroom implementation. They are used in designing curriculum with multiple means of representation, expression, and engagement. Developed by David Rose and Anne Meyer at the Center for Applied Special Technology (CAST), the core of this process is curating user's interactions within academics with a purpose to improve upon educational services (Edyburn, 2005). The purpose of this thesis is to identify areas of improvement in financial education, discover an effective teaching method with understanding these complex principles, and to educate college students on managing personal finances.

LITERATURE REVIEW

Financial Literacy

Studies suggest that debt has risen across generations and that people are increasingly “carrying debt well into retirement” (Lusardi and Mitchell, 2017). This is a frightening thought, given that making these choices is more common than believed to be (Hung et al., 2009). More and more people find themselves struggling with making ends meet, emergency expenses, being debt-constrained, and long-term financial security (Lusardi and Mitchell, 2023). In two decades of research, Lusardi and Mitchell (2023) do not see “financial literacy improving in the aggregate”. This is increasingly worrisome seeing as student debt has especially risen over the years. It is reported that student-loan debt is the highest form of debt in the United States, totaling more than “more than \$1.6 trillion” (Council on Foreign Relations, 2023).

Hung et al. (2009) found several variations of financial literacy within their research process. Consequently, the authors defined financial literacy and financial education as distinct vocabulary. Financial literacy is the ability and knowledge to use financial resources while financial education is the process of improving your knowledge using these processes. Both definitions involve understanding the knowledge, skills, and confidence to manage personal finances to successfully position yourself for a future of financial well-being (Hung et al., 2009; Ouachani et al., 2021; Garg, 2018; Lusardi, 2010). This includes studying material in budgeting, saving, investing, and borrowing.

Sonia Ouachani’s 2021 article compiles the existing literature regarding key aspects of financial literacy. The author’s article, along with several others, discusses two aspects of financial literacy as objective and subjective material. Objective topics reference participants’ financial knowledge and skills (Ouachani et al., 2021; Garg, 2018; Lusardi et al., 2010). This can be measured in a quiz to understand what participants do and do not know.

Comparatively, subjective material references participants’ behavior and confidence in the financial decision-making process (Ouachani et al., 2021; Garg, 2018; Lusardi et al., 2010). These measurements examine the extent of an individual’s current knowledge of finance from basic to advanced comprehension of the subject matter. This scope has been consistent in

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research conducted and organized by Annamaria Lusardi and Olivia S. Mitchell. A University Professor of Economics and Accountancy at George Washington University and a University Professor of Business Economics and Public Policy the Wharton School, who have been studying financial literacy for the last 20 years.

Lusardi and Mitchell compiled their aggregated knowledge of financial literacy into a journal dictating the relevance financial literacy has in not only the US economy, but also globally (Lusardi and Mitchell, 2023). The pair uncover insights in financial literacy education, like families whose mother's obtained a degree of higher education were more knowledgeable than others on topics relating to finance (Lousardi et al., 2010). Perhaps the most important finding is a measure of financial education using a simple questionnaire of the "Big Three"; questions geared towards interest, inflation, and risk diversification that has showed up the publications and recommendations of government organizations worldwide (Lusardi and Mitchell, 2023). The two discovered that "43% of respondents answer all of the questions correctly" and that "only 29% of women answer all three questions correctly" (Lusardi and Mitchell, 2023).

Financial education helps individuals achieve life goals by reducing financial stress, building financial security, driving financial mobility from poverty, and fostering a retirement (Ouachani et al., 2021; Garg, 2018; Lousardi et al., 2010). However, research suggests that many people lack adequate financial literacy. This can lead to people making poor decisions, increased debt, and distress (Huston, 2009). Hung et al. (2009) offer 3 lessons learnt from the '08 - '09 financial crisis: poor decision making is common, these setbacks build up over time, and they are difficult to recover from. Research proves that financial education contributes to more economically favorable financial situations, witnessed in Clark's 2017 study linking stock market participation with increased risk adjusted returns (Clark, 2017). Financial literacy better equips the basic saver with goals regarding their personal finances and fundamental risk management practices.

Although financial education seems like an end-all solution to potential financial ruin for users of the monetary system, both Hung et al. (2009) and Sandra J. Huston (2010) agree that there is an inadequate system used to measure the success of educational programs. In fact,

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seventy-six programs in thirty-three countries prove that financial literacy education proves to increase an individual's knowledge, skills, and confidence in the financial decision-making process (Lusardi, 2023). Financial education plays a large role in the financial well-being, or "financial freedom to make choices that allow one to enjoy life" (Sticha, 2023). Studies show a correlation between a strong understanding of financial education and their practical applications are most effective when taught as a traditional, stand-alone course (Tennyson and Nguyen, 2005). More than eighty countries have national strategies for financial literacy education, of which the United States is not one (Lusardi, 2023). The US cannot federally mandate a national curriculum but suggest standards of proficiency to state and local governments in areas like reading and writing. Some key statistics show that financial education strengthens financial knowledge and behavior, is increasingly more effective as additional studies come out, and are as effective as its analogous research topics in health and sustainability education (Lusardi and Mitchell, 2023).

Huston (2010) argues that financial literacy is a multifaceted idea that cannot be fully captured by a single measure. Therefore, the author proposed a framework for measuring an individual's financial knowledge post-education. It includes questions about financial intelligence, skills, attitudes, confidence, and behavior. Similarly, Ouachani et al. (2021) collated existing literature to discover the most effective questions asked when understanding financial literacy. Topics, from most frequently to least frequently asked, include investments/savings, borrowing, consumption, insurance, earning, go-to information sources, and risk comprehension (Ouachani et al., 2021). The authors argued that measuring financial literacy using this outline could help identify where financial education is needed. It could also be used to evaluate the effectiveness of financial education programs.

Learning Styles and Universal Design for Learning

Learning Styles were first introduced in 1979 by Project Cite. It suggests that every student has a specific learning style they prefer to be taught in. The team hypothesized that these styles should ultimately increase student performance academically (Dunn & Dunn, 1979). A meta-analysis conducted by Rita Dunn examines 42 studies that incorporated her initial referendum to education. Of the 42 studies, 36 were utilized in judging the validity of their

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hypothesis (Dunn, 1995). When learning styles were integrated into academic examinations, students who previously failed with standard education models witnessed “significantly higher standardized achievement test scores” (Dunn, 1995). Additionally, a 4-year investigation by the United States Office of Education concluded that learning styles “was one of the few strategies that had impacted positively on the achievement of classified special education students” (Dunn, 1995).

An earlier case study by Friedman and Alley at the College of Education, Wichita State University found that incorporating learning styles into parent teacher conferences had an equal impact on caregiver comprehension (Friedman and Alley, 1984). This was conducted as an external observation upon their original study regarding learning styles and student education. The basis for the study was that “teachers have the obligation to broaden their teaching styles to support opportunities for students”, because “teachers subconsciously operate on the assumption that the way they learn is the most effective way for everyone to learn” (Friedman and Alley, 1984). As a result, the team tested five approaches to Dunn and Dunn’s 1979 observation of Learning Styles. Upon identifying student learning styles, teachers in Wichita witnessed increased student engagement in the curriculum, learning outcomes, student achievement, parental satisfaction, student confidence, and communication in the district (Friedman and Alley, 1984). When teachers integrated their own learning style, they found teaching easier (Friedman and Alley, 1984). Today, learning styles have been retrofitted to a more encompassing category of educational reform known as Universal Design for Learning.

Universal Design for Learning (UDL) is an approach to education that is intended for students with learning disabilities. The purpose of the Center for Applied Special Technology (CAST) is to create guidelines for teachers to implement UDL in their classrooms. This is a reaction to the 1997 Individuals with Disabilities Education Act (IDEA) (Edyburn, 2005). Proponents of CAST and IDEA believe that “education as a societal practice is a wicked problem” characterized by the notions that there is no single best solution to an obstacle as large as this and it is a Pandora’s Box that creates additional wicked problems when acted upon (Basham, 2020).

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UDL aims to assist all educators with classroom instruction by eliminating biases and emphasizing diversity, equity, and inclusion. UDL is a “goal driven, student-centered, instructional framework” that provides “supports [to] school personnel necessary for the child to advance appropriately toward the annual goals, to progress in the general curriculum, and to be educated” by “[transforming] educational design and practice until learning has no limits” (Basham, 2020; Edyburn, 2005; Boysen, 2021). Like learning styles, it promotes the use of a mixed methods approach to education by explaining the notion that every student learns differently and prefers education. The main purpose is to increase learning amongst the student population.

The principles for teachers were mentioned in brief as multiple means of representation, expression, and engagement. Representation refers to the physical material and the various design approaches that can communicate the same message (CAST). Expression refers to the notion that students prefer to demonstrate knowledge differently and educators should be accommodating (CAST). Engagement promotes students to research topics of interest to advance motivation (CAST). These core principles are backed up with a 3x3 matrix of 9 guidelines and thirty-one checkpoints (CAST). Dave Edyburn’s article on UDL in the Special Education Technology Practice offers examples of UDL that have been implemented in different subjects like science and literature (2005). Included is the customization of learning with the ability to use online platforms to change languages, font sizes, reading speeds, and depth of the subject (Edyburn, 2005). This allows the student to fully understand the material provided. Learning styles and universal design for learning are concepts rooted in equitable education, ultimately ensuring that students understand course material no matter the method of material.

Current Literature in UDL and Financial Literacy Education

In brief, journals addressing Universal Design for Learning and financial literacy provide a lack of breadth in their studies. Understandably, UDL’s target audiences have learning disabilities and a NCLB, No Child Left Behind, principle. Yet, the existing literature between the two diverts attention away from the abled body students and their experiences with UDL. Studies include a review of five online courses in financial literacy education led by Mary

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Beth Henning and Sarah Johnston-Rodriguez at Northern Illinois University, and subsequently educating preservice teachers on financial literacy curriculum, again, led by the researchers (Henning, 2018; Rodriguez, 2019).

In their original article, Henning and Johnston-Rodriguez addressed the plague on financial literacy education, particularly for students with learning disabilities (2018). They found discrepancies between the material offered and their approach to educating. The purpose of their study was to evaluate UDL influences in these financial resources and provide feedback to the content originators. Their 2019 study provided a rubric for evaluating financial literacy education (Rodriguez). Finding that students with learning disabilities need increased financial literacy education, Rodriguez and Henning provided preservice educators with multiple curricula to not evaluate. Using the rubric, these teachers recognized one resource for its proficiency in connecting UDL with finances: Practical Money Skills for Life by Visa. The authors found that not only were students with learning disabilities lacking knowledge, but the preservice educators as well (Rodriguez, 2019). This is in accordance with previous literature addressing the call for increased financial literacy education across demographics.

Arguments in Implementing Learning Styles and UDL

Learning styles are a controversial topic in the realm of education. Many proponents against the ideology argue that it is not an effective approach to teaching. Hence why there is little to no research on learning styles past the 1990s. Even still, twenty-nine states and the District of Columbia require a fundamental understanding of learning styles for the licensure of their teaching professionals (Furey, 2020). Studies show that 67% of educators require students to implement their learning styles into lesson-planning assignments (Greenberg, 2016). Additionally, 76% of 600 educators witness an increase in student comprehension when teachers implement learning styles into the classroom (Macdonald, 2017). Still, there is no empirical evidence proving that there is any direct correlation between learning styles and student performance.

In fact, sources say that there is a lack of evidence drawing any connections between these two measures (Furey, 2020). It is believed to be a self-fulfilling prophecy; teachers see increased performance in the classroom and thus believe that learning styles are working. Not

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only that, but it is an unsubstantiated belief that does not apply to all students. In actuality, “students learn more deeply from words and visuals than from words alone” (Yale). Not only does it not apply to all students, it also does not apply to all subjects (Yale). It is easier to understand a geometry class using visuals with narratives and a lab using a tactile approach with explanations.

One article stood out for its perspective on Learning Styles and Universal Design For learning. “Lessons (Not) Learned: The Troubling Similarities Between Learning Styles and Universal Design for Learning” by Guy A. Boysen plays devil’s advocate for the movement (2021). Boysen addresses five key issues with the radicalization of education and learning. Boysen claims that the problems with learning styles and UDL lie with the lack of evidence, difficulty in operationalization, the overemphasis on diversity, an overemphasis on matching, and overgeneralization of neuroscience (2019). There will be a brief discussion on Boysen’s reservations and counterarguments to his stances on evidence, operationalization, and diversity.

Firstly, Boysen argues there is a lack of evidence on the effectiveness of UDL compared to previous studies on alternative concepts because of lack of “experimental designs needed to demonstrate causation” (2019). James D. Basham from the University of Kansas and Senior Director for Learning & Innovation at CAST boasts that “research indicates UDL improves academic performance” (2020). Boysen argues that “there is a lack of evidence showing that instruction based on learning styles or UDL increases learning” (2019). Yet, an Indonesian examination of existing literature on UDL conducted by Salamiah Sari Dewi at the Universitas Medan Area offers five cases that documented an increase in learning (2019). These studies were conducted across differing age groups, from kindergarten to post-graduate studies, and amongst a mix of students with and without learning disabilities. Each study notes at least one instance of an improved sense of engagement in the curriculum, an increase in confidence and self-efficacy, and reduced stress (Dewi, 2019).

Next, Boysen argues that operationalization of UDL is too difficult due to its complex nature and the overemphasis of diversity overcomplicates practicality (Boysen, 2019). Three principles, nine guidelines, and thirty-one checkpoints make it difficult to create a standard

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curriculum (Boysen, 2019). Additionally, the reliance on diversity of educational practices is not a realistic approach to teaching when each student needs an individualized program (Boysen, 2019). However, CAST does not expect educators to use every guideline and checkpoint, but to strategically mix and match the criteria based on a specific learning outcome. The organization understands the complexity and recommends retrofitting the concepts for each instance (CAST). Circling back to Edyburn's analysis of UDL and assistive technology, subjects like science and literature use customizable online databases to educate students (2005). By offering assistive features like changing the depth of topics, narrators, languages, and customizable fonts, students have flexibility and reduced barriers (2005).

Boysen's argument on the overemphasis on matching instruction explains the extreme variability in instruction and that there is no support to the claim that students learn better by choosing their own learning experience (2019). Studies suggest that students may opt out for the most effective method and choose the most practical due to poor planning (Blaisman, 2019). Regarding neuroscientific arguments, Boysen disagrees with the claim that UDL can be associated with a specific area of the brain (2019). Our understanding of the brain is too simple to fully understand the claims, and there is no evidence to support their hypotheses of brain functions to cognitive understanding.

METHODOLOGY

The integration of universal design for learning in financial literacy has the potential to make individual finances easier to understand, more accessible, and more engaging for users. This can lead to people making better financial decisions, increased savings, and financial stability. There are gaps in financial literacy across various segments of the population, particularly among younger people and those with lower levels of income and education. Researching financial literacy can help identify these gaps and develop programs through design thinking to improve financial literacy amongst these groups. I want to understand what students know about financial literacy, what their preferred learning styles are, and if the fusion of these topics leads to increased student comprehension.

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The scope of this study is to research the impact of financial literacy on personal financial management of young adults in the United States. The study will focus on identifying the gaps in financial literacy between the participants and the effectiveness of financial education programs in improving financial literacy. Existing research conducted by Huston (2010) and Hung et al. (2009) have concluded that there is no measurement of the effectiveness of financial literacy education programs because the surveys used lacked user behavior in finance.

People with financial education are better prepared to make informed decisions and manage their money effectively. People who are financially literate are also more likely to be financially included, meaning they have access to financial services and products that can help them achieve their fiscal goals. By encouraging individuals to save using innovative financial literacy education, this will foster increased savings and financial stability within the United States. My data sources include case studies based on previous interviews and surveys regarding attitudes towards financial education and financial services. In terms of ethnography, potential problems that can be anticipated include the availability of resources. This includes scales for the measurability of an individual's financial literacy, the availability of qualified personnel, and willing participants. Some ethical issues that need to be considered include informed consent from participants, the protection of privacy, and ensuring that the research is conducted in an ethical and respectful manner.

This study will use a qualitative data collection method. The qualitative research will include a survey of young adults in the United States. This will be used to measure the level of financial literacy and personal financial management practices amongst these adults. This survey also aims to understand the most used approaches to learning amongst young adults. Finally, the survey aims to recognize which aspects of financial literacy students have the biggest struggle understanding. Questions on financial literacy are the "Big Three" that Annamaria Lusardi and Olivia S. Mitchell use to gauge individual proficiencies. I added one question on compounding interest, as I believe it is just as relevant in today's financial climate.

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Using questions based on Project CITE's (1976) study, the study will conclude which approaches are most effective when learning. I used learning styles because many educators advocate that they are effective at increasing student performance in the classroom. Not only that, but more than half the states require an adequate understanding for licensure. Even still, empirical data suggests that there is no connection between these styles and academic progress. I am testing the validity of these arguments regarding financial literacy. Finally, correct answers to financial literacy related questions are in bold.

RESULTS

Of all the Freshman class at Bryant University graduating in 2027, 76 answered the first survey, and 38 completed the second. Of that, only 30 surveys were usable, after filtering for completeness and if students were paying attention to Question 3. Of the 30 students surveyed, 28 were from Northeast United States, predominantly Massachusetts with 2 international students from South Korea and the Dominican Republic (see Figure 1.2.1). Figure 1.3 shows that most students surveyed were not first-generation students. Performance against financial literacy education questions cannot determine which demographics excelled due to the lack of diversification. Finally, there is almost a 50/50 makeup of students with preexisting financial literacy education, however Figure 1.4.2 shows us that there is no significant difference between the performance of these students against financial topics.

Survey 1 tested initial performance of financial literacy and what their preferred learning styles are. The results suggest that men surveyed performed 35% better than women on finances, as seen in Figure 1.1.2. Beginning with Learning Styles results of Survey 1, Figure 2 shows us that most students are visual learners, meaning that they prefer using a means of visualization like flashcards, videos, and images to best understand material. This coincides with an increase in the digitalization of classroom material witnessed in recent years. Again, it is difficult to determine which type of Learning Style performed best overall regarding financial topics due to the lack of survey responses.

Aggregated information on students who took at least 2-minutes to complete Survey 2 tells us that when learning styles are incorporated within the Auditory and Visual groups, these

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students perform better overall. They see a 15.38% and 2.04% increase in class grades, respectively. The Tactile group witnessed no change with the time constraint applied. These results are depicted in Figures 3.2.2, 3.3.2, and 3.4.2. Not accounting for a time constraint can still see an overall class grade increase of 5.00% from 80.83% to 85.83% in Figure 4.1.1 and 4.1.2. This means that students who took their time answering the second survey witnessed a better understanding of the material, given their individual learning styles.

LIMITATIONS

The limitations of this study help determine improvements for further research in financial literacy education and universal design for learning. Included are participation, survey length, and learning style implementation. The lack of participation from students makes it difficult to witness any significant contribution to this area of study. Additionally, the lack of participation in specific areas of Learning Styles again makes discovery near impossible. The length of the survey deterred students from taking it. Although made to be like a BuzzFeed Quiz, the duration was a deterrent, especially given the number of surveys needed. A better implementation of this study would be done across entire classes of students with the same Professor. Finally, the tactile approach to Learning Styles was difficult to implement and monitor. It requires physical activities like building, moving, or drawing. These limitations should be improved upon for the next attempt at the cross-implementation of these design topics.

CONCLUSION

Financial education is an important skill that is essential for making informed financial decisions and achieving financial well-being. Aspects of universal design for learning have the potential to transform financial literacy education programs by creating innovative solutions that are tailored to the needs and behaviors of different groups of users. While there are challenges associated with implementing universal design in financial literacy programs, the benefits of using this approach are clear. To create innovative financial products and services that better meet the needs of customers and the potential to address economic inequalities.

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What can be assumed is that more students today prefer to learn using visualizations due to the increase in reliance on technology. Students' dependency on materials like laptops, tablets, and cell phones to not only perform day-to-day tasks, but also utilize them as a source of entertainment may mean that they also prefer to learn using similar devices. A modern-day example of Universal Design for Learning in classrooms is ABCMouse.com, an early learning online platform that engages all a student's senses and allows for individualization in a student's learning. It can also be presumed that the proper incorporation of Learning Styles can lead to increased overall classroom grade, as witnessed in studies conducted by Dunn (2019), Friedman and Alley (1984), CAST, and Dewi in (2019).

To summarize, most students utilized the visual learning style in their self-assessment of preferred, actionable outcomes. This may be attributed to the increase in digitalization and overreliance on technology in classroom settings. This includes the mobilization of grading, homework, and study materials. Survey results suggest that students struggle most with understanding compound interests. This topic is vital to the financial decision-making process, as it has a direct impact on some of the largest purchases in a person's lifetime. Finally, the survey shows that the implementation of learning styles did lead to a better understanding of financial literacy for visual and auditory learners.

APPENDICES

Appendix A – Student Survey One

1. You prefer to:
 - Listen to things rather than read about them
 - Analyze pictures, graphs, and charts
 - Handle physical objects and try to understand how they work for yourself
2. You remember things by:
 - Saying them out loud
 - Watching a demonstration
 - Experiencing them for yourself (being hands on)
3. You find reading:
 - Takes too long; you get fidgety
 - The best and most relaxing thing ever
 - Pretty boring; you'd rather be outside
4. You're more likely to remember somebody's:
 - Name
 - Face
 - Hug
5. When you see the word "cat", what do you do?
 - Picture a cat in your mind
 - Say the word "cat" to yourself
 - Think about being with a cat (stroking it or hearing it meow)
6. What kind of book would you like to read for fun?
 - A book with lots of images

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- A book with lots of words and details
 - A book with word searches or crossword puzzles
7. If you're ever unsure of how to spell a word, what are you most likely to do?
- Write it down to see if it looks right
 - Spell it out to see if it sounds right
 - Trace the letters in the air with your finger
8. You're out shopping and you are standing in the queue at the checkout. What are you most likely to do while you are waiting?
- Look around at other clothes
 - Talk to the person next to you in the queue
 - Fidget, move about or rock / lean on your feet
9. What's the best way for you to study for an exam?
- Read the book or your notes and review pictures or charts
 - Get a friend or family member to ask you questions that you can answer out loud
 - Make index cards that you can review
10. What do you like to do to relax?
- Read
 - Listen to music
 - Exercise (walk, run, play sports, etc.)
11. Interest is earned on the money you have in a bank account. That means it is added to the existing amount you own. This is typically done at the end of every year, or annually. Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

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- ☐ **More than \$102**
- ☐ Exactly \$102
- ☐ Less than \$102

12. Inflation causes your money to be worth less today than it is in the future. That means what you can buy for \$10 today, might cost you \$12 next year. Think of inflation like interest, but for the price of stuff you want to buy. It makes them more expensive. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, do you think you would be able to buy more than, exactly the same as, or less than today with the money in this account?

- ☐ More than
- ☐ Exactly the same
- ☐ **Less than**

13. You owe \$3,000 on your credit card. You pay a minimum payment of \$30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges? If you are paying attention, please select the ten-years option.

- ☐ Between 5 and 10 years
- ☐ **10 years**
- ☐ More than 10 years

14. When investing, it is good practice to buy stock in a lot of companies instead of just one. It's like putting all your eggs in one basket. Dropping that basket will crack all your eggs. You put them in many baskets, so if one fails, it doesn't affect you as much. Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a portfolio of many stocks".

- ☐ True

- **False**

15. As we learned, interest grows the money you have in a bank account. Compound interest means you earn money not just on the amount you have in an account, but also on the money you earned from that interest. Suppose you owe \$1,000 on your credit card and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double?

- 2 years
- **Less than 5 years**
- More than 10 years
- I don't know

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Appendix B – Student Survey Two

Figure A: Tactile Questions

1. Interest is earned on the money you have in a bank account. That means it is added to the existing amount you own. This is typically done at the end of every year, or annually. If you have \$100 in principal and earn 10% interest in 1 Year, at the end of that year, you will now have $(\text{Principal} + (1 + \text{interest rate})^{\text{Number of years}})$ dollars. How much money do you have after 1 year?
 - \$100.10
 - \$1000
 - \$101
 - **\$110**
2. Inflation causes your money to be worth less today than it is in the future. That means what you can buy for \$10 today, might cost you \$12 next year. Think of inflation as interest, but for the price of stuff you want to buy. It makes them more expensive. A cheeseburger meal at McDonalds costs you \$10 right now. You also have \$10 in the bank. With 50% inflation and 40% interest in the bank, can you buy more, less, or the same number of burgers in 1 year?
 - More
 - **Less**
 - The Same
3. When investing, it is good practice to buy stock in a lot of companies instead of just one. It's like putting all your eggs in one basket. Dropping that basket will crack all your eggs. You put them in many baskets, so if one fails, it doesn't affect you as much. True or False? A grocery store that sells a wide variety of products makes more money than a grocery store that sells only cereal.

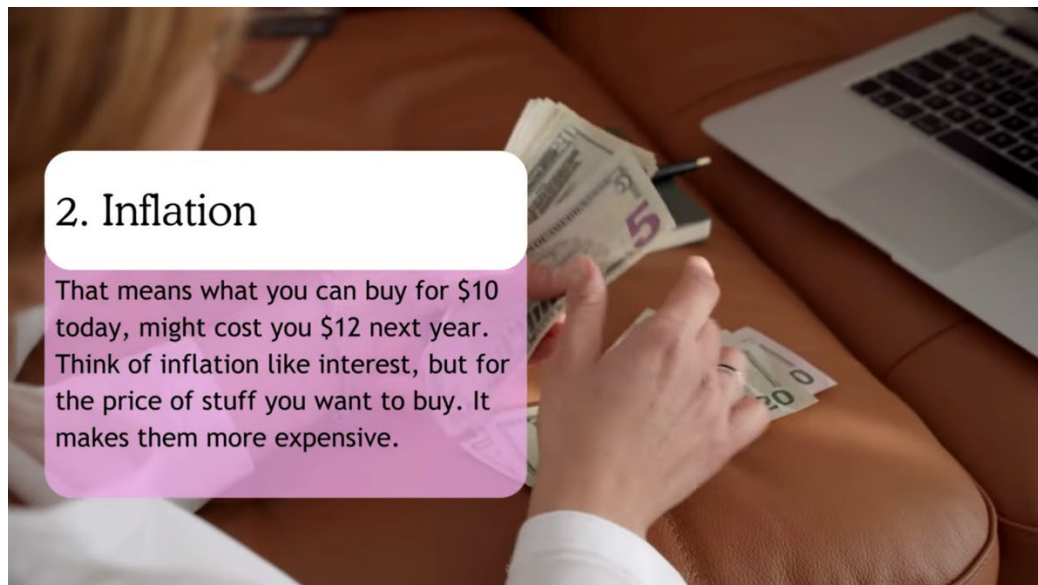
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- **True**
 - False
- 4. As we learned, interest grows the money you have in a bank account. Compound interest means you earn money not just on the amount you have in an account, but also on the money you earned from that interest. Looking back at problem 1, your \$100 with 10% interest will earn you \$121 after 2 years. Interest = (Principal + (1 + interest rate)^{Number of years}). Suppose you owe \$1,000 on your credit card and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double?
 - 2 Years
 - **Less than 5 Years**
 - More than 10 Years

Figure B: Visual Video

Note: If the video were stripped, the audio remaining is the same for Auditory prompts.



Video Link: <https://www.youtube.com/watch?v=MZ3-Gp4CRdA>

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Appendix C – Results of Survey

Figure 1.1.1: Gender Demographic of Completed Surveys

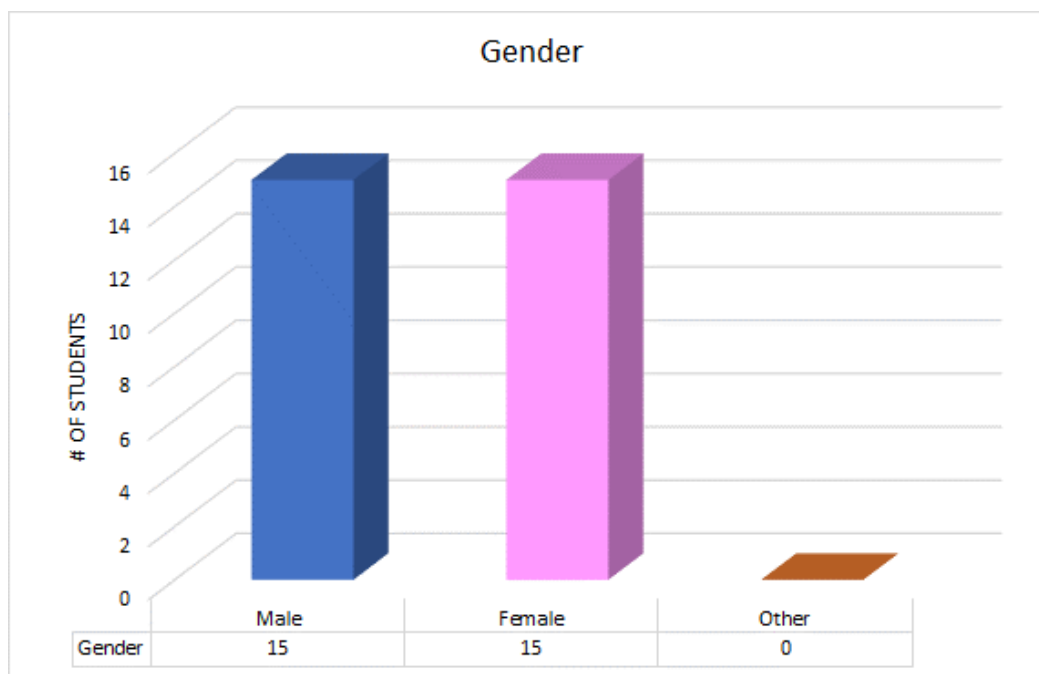
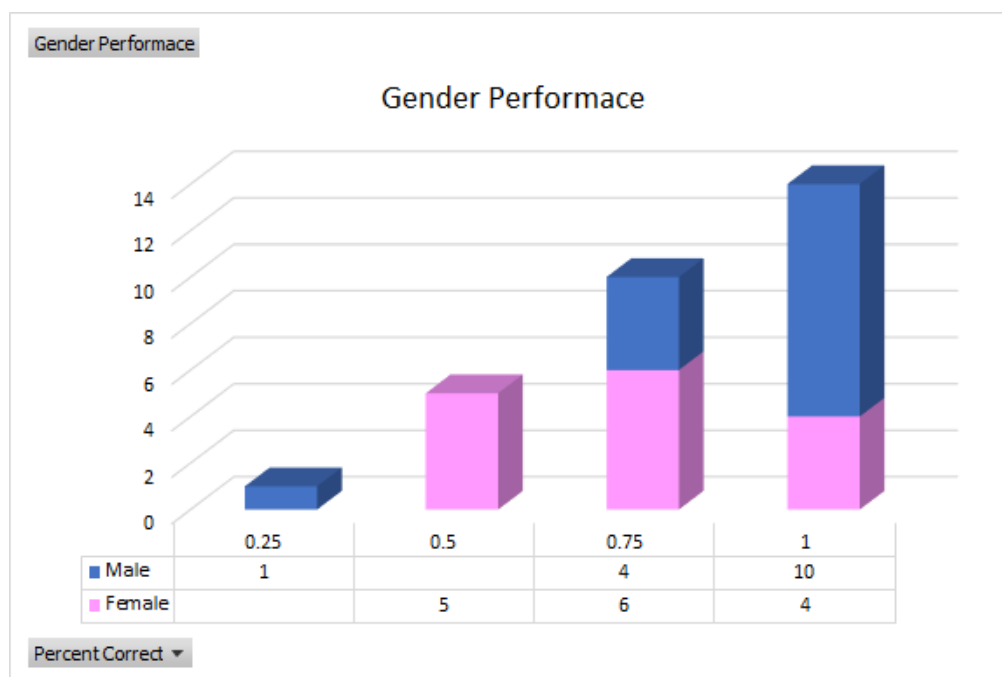


Figure 1.1.2: Gender Performance of Completed Surveys



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Figure 1.2: Location Demographic of Completed Surveys

Not shown are 2 surveys completed by international students from South Korea and The Dominican Republic

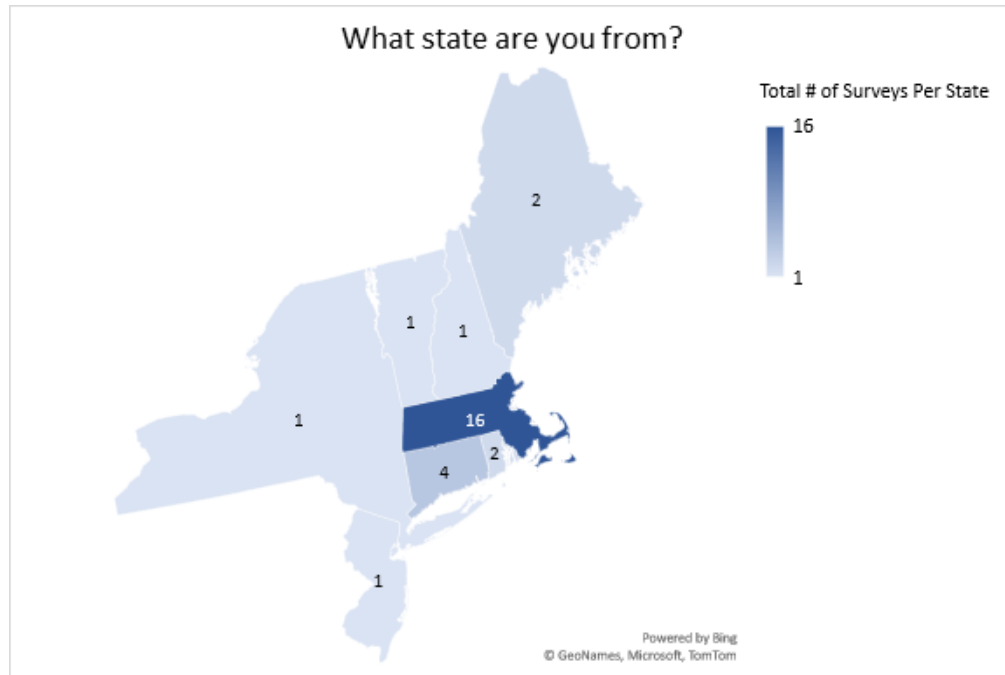
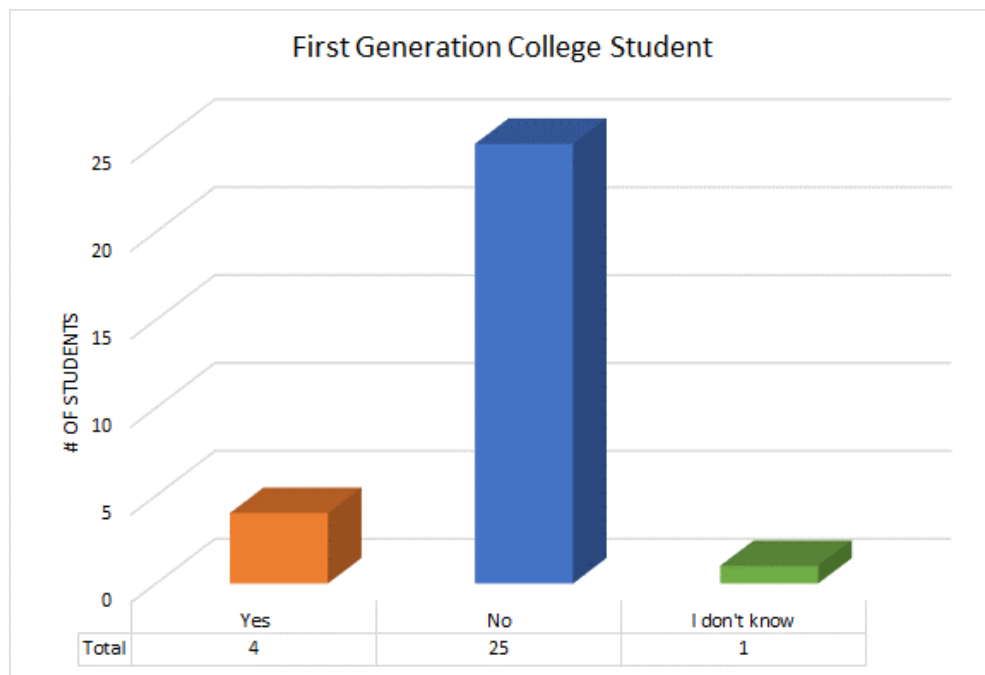


Figure 1.3: First Generation College Student Demographic of Completed Surveys



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Figure 1.4.1: Previous Financial Literacy Experience Demographic of Completed Surveys

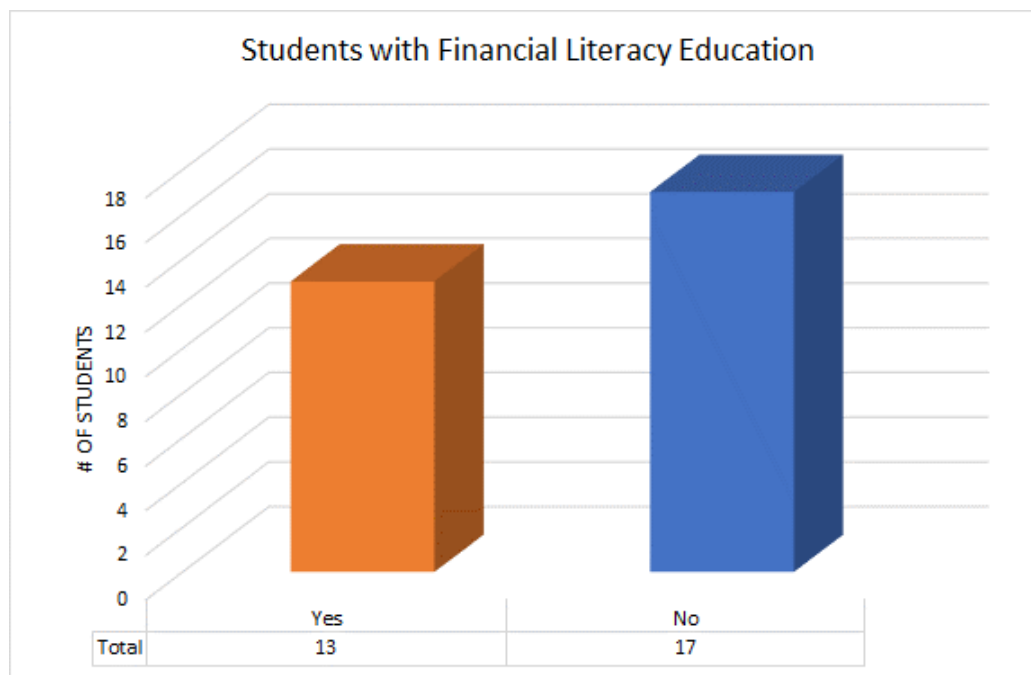
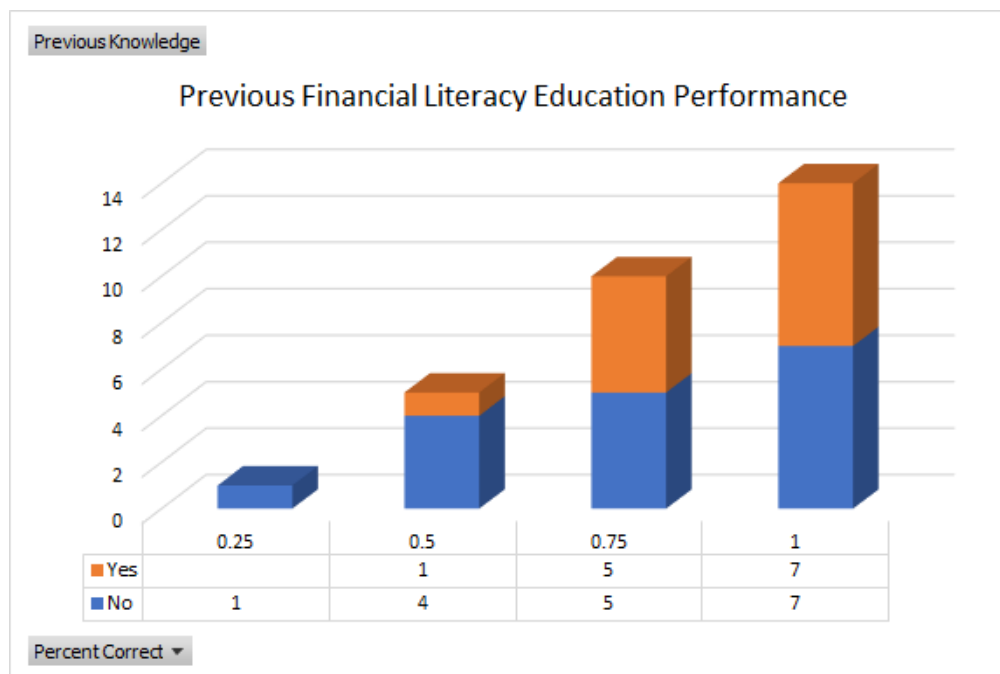


Figure 1.4.2: Previous Financial Literacy Experience Performance of Completed Surveys



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Figure 2: Learning Styles Breakdown

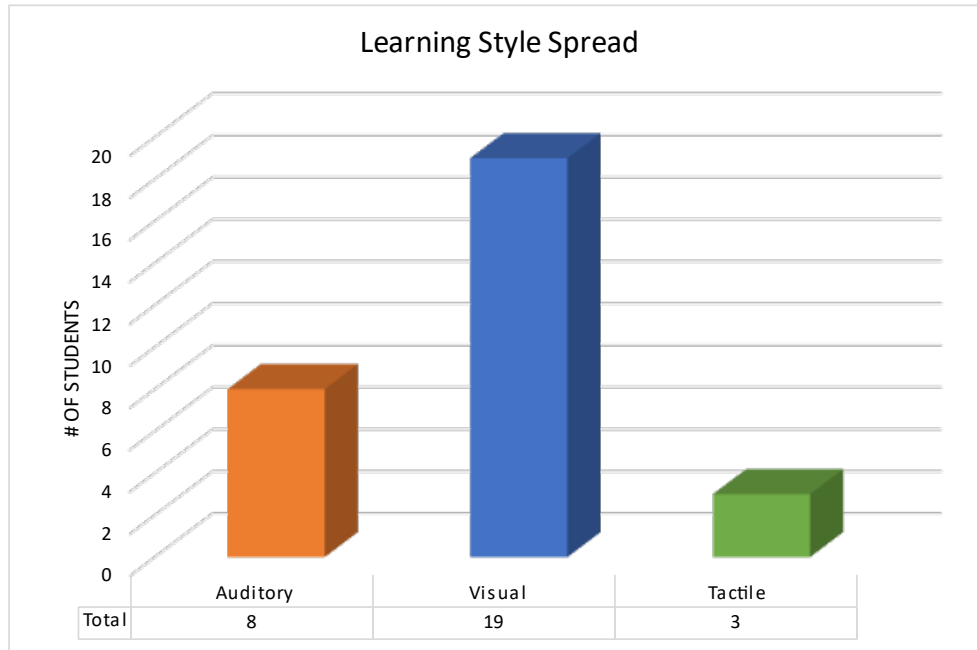
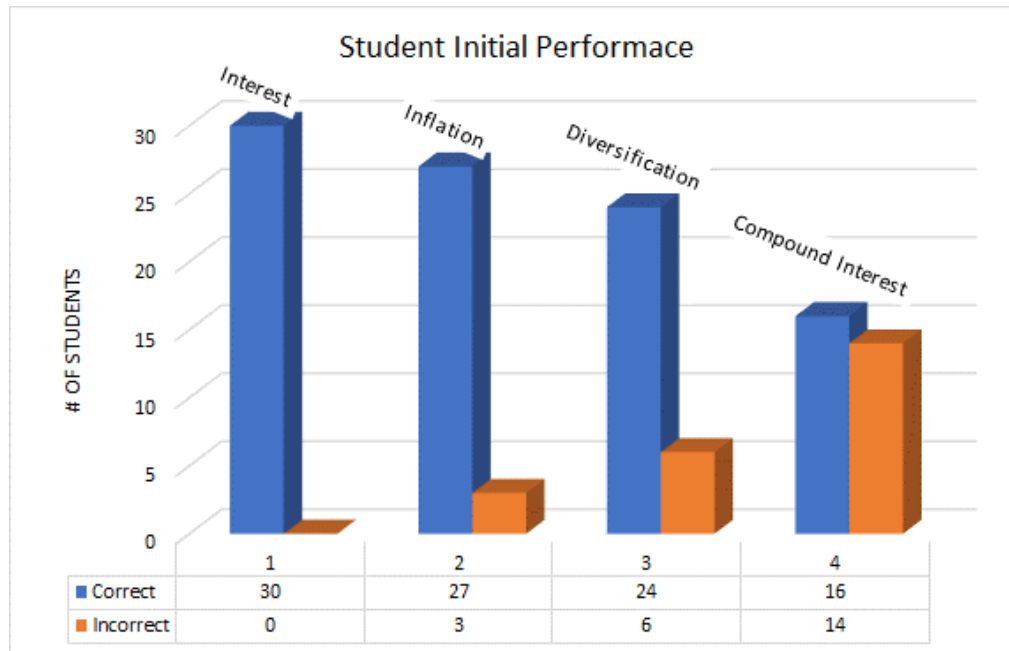


Figure 3.1: Financial Literacy Results



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Figure 3.2.1: Overall Financial Literacy Auditory Progress

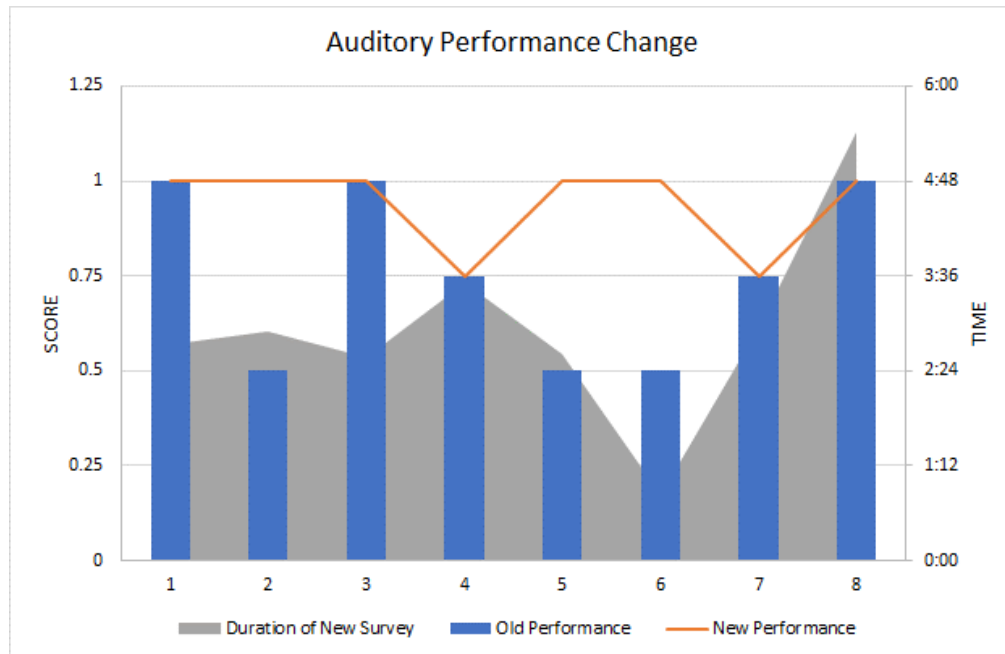
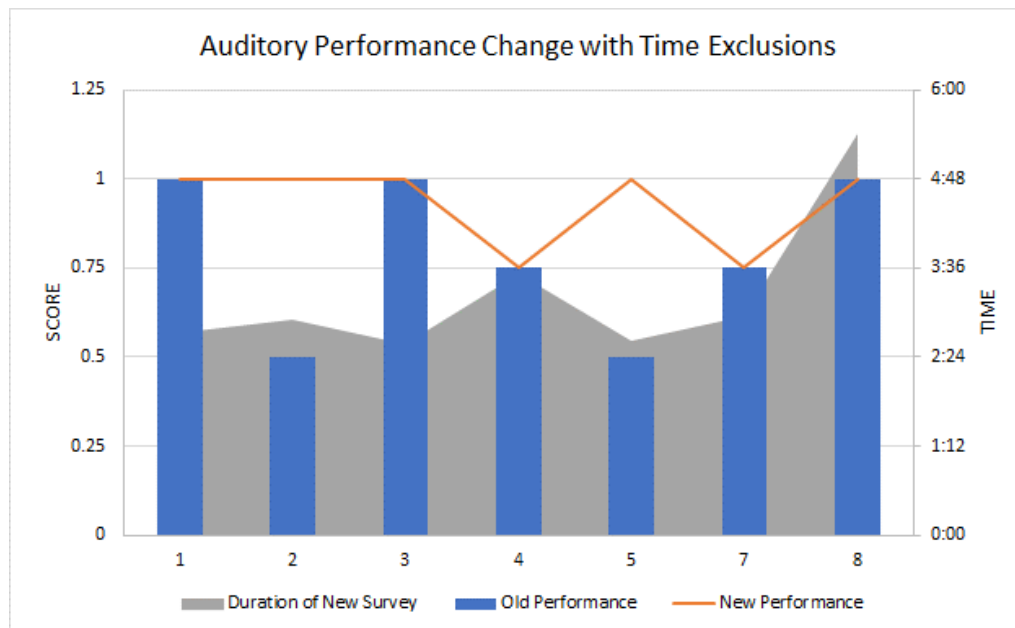


Figure 3.2.2: Overall Financial Literacy Auditory Progress with 2-Minute Minimum



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Figure 3.3.1: Overall Financial Literacy Visual Progress

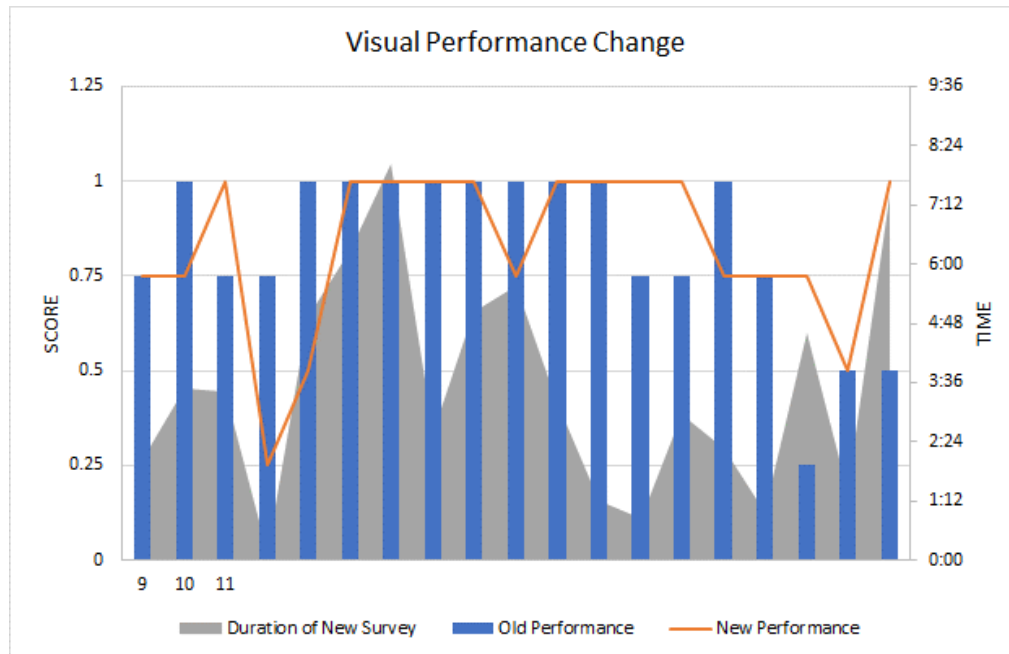
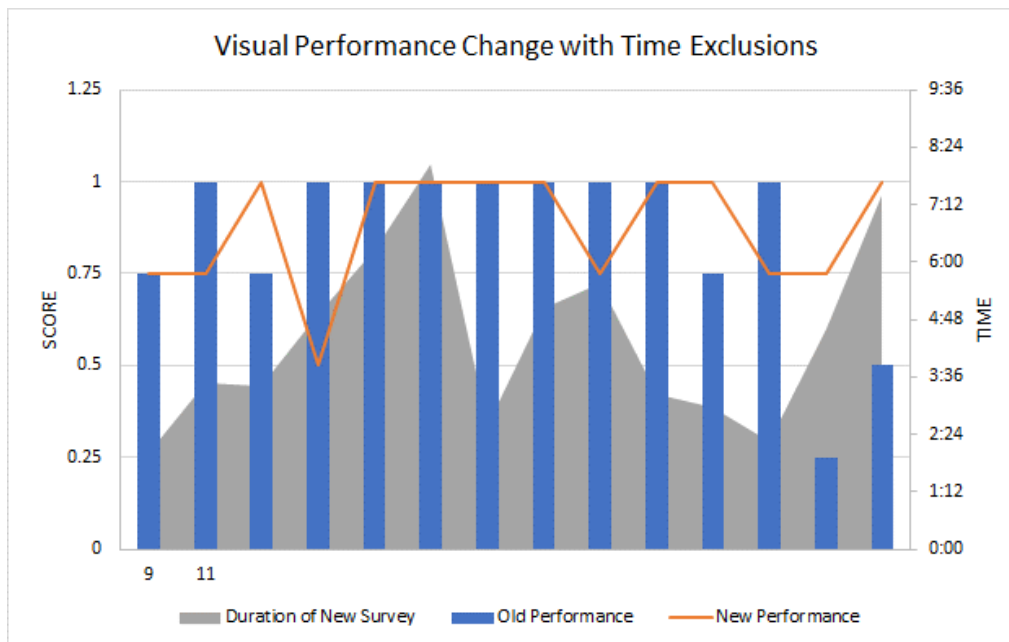


Figure 3.3.2: Overall Financial Literacy Auditory Progress with 2-Minute Minimum



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Figure 3.4.1: Overall Financial Literacy Tactile Progress

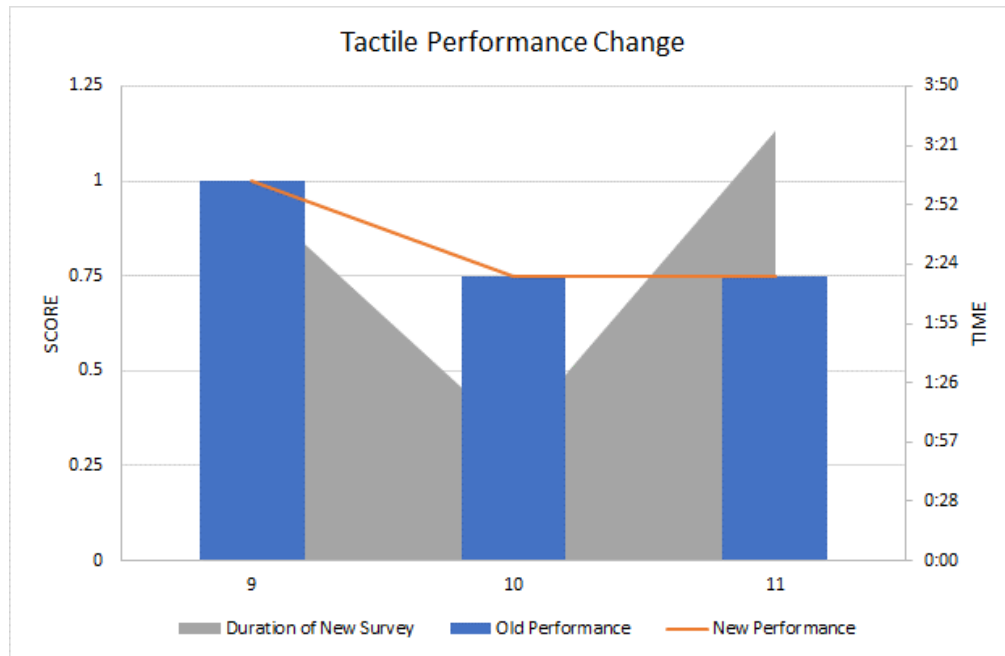
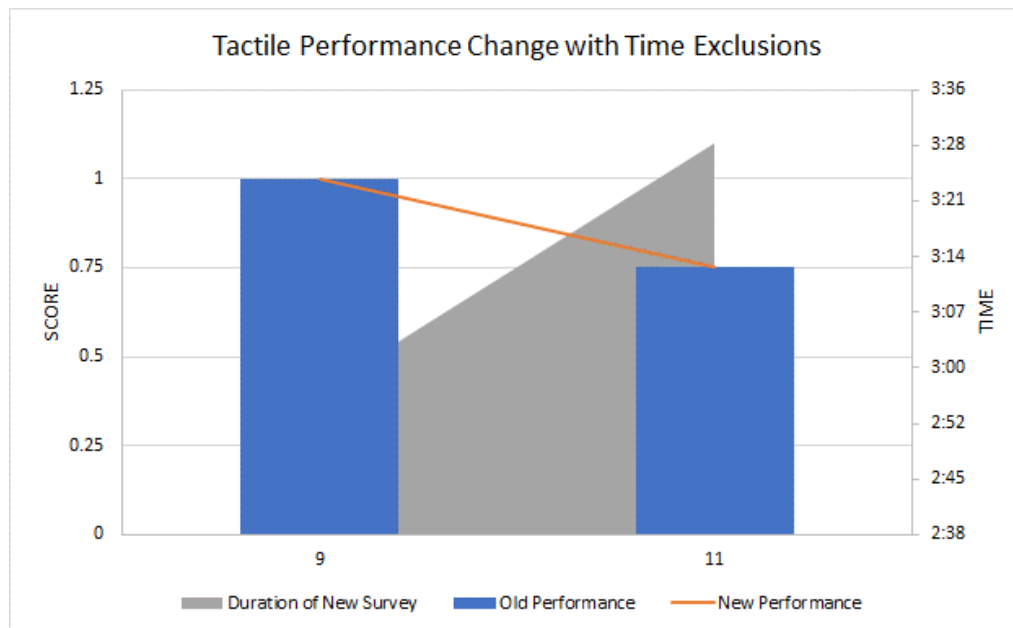


Figure 3.4.2: Overall Financial Literacy Tactile Progress with 2-Minute Minimum



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Figure 4.1.1: Individual Student Performance

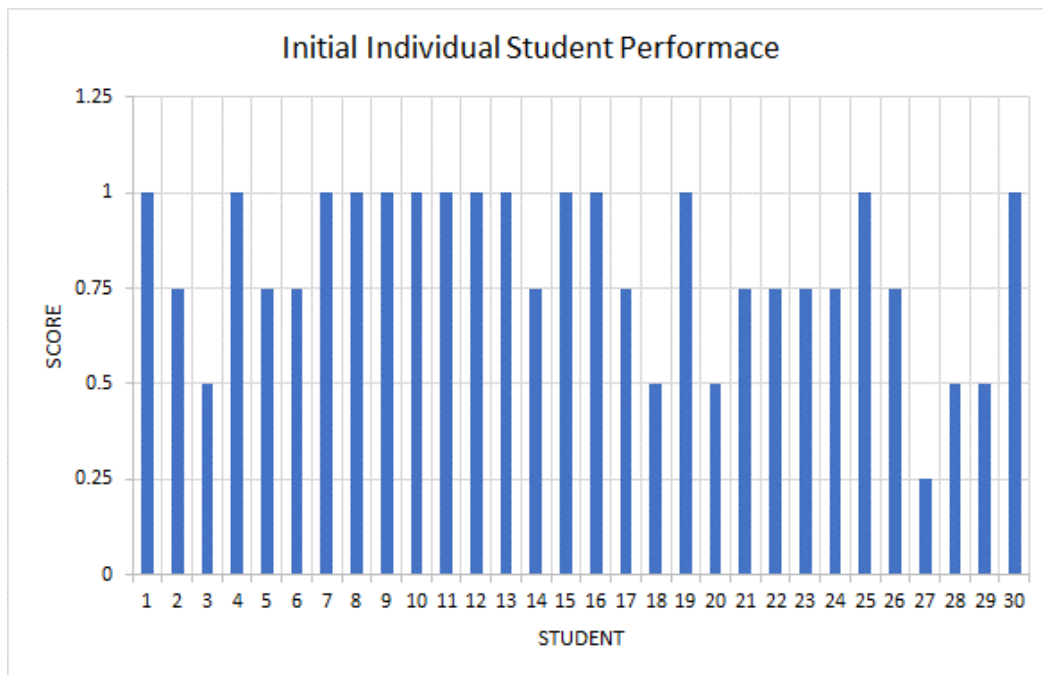
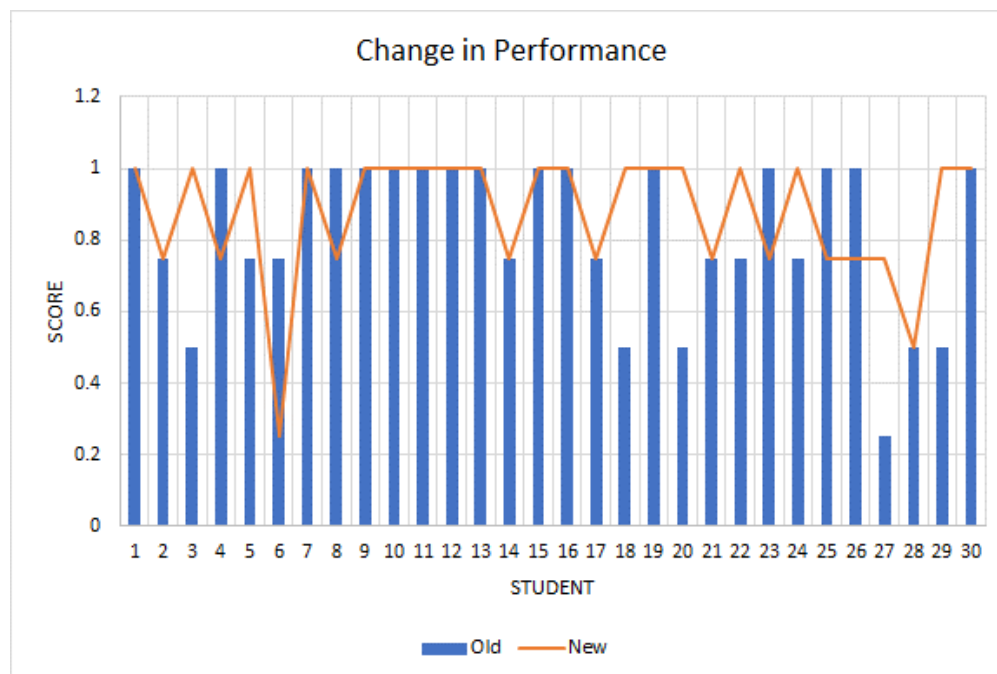
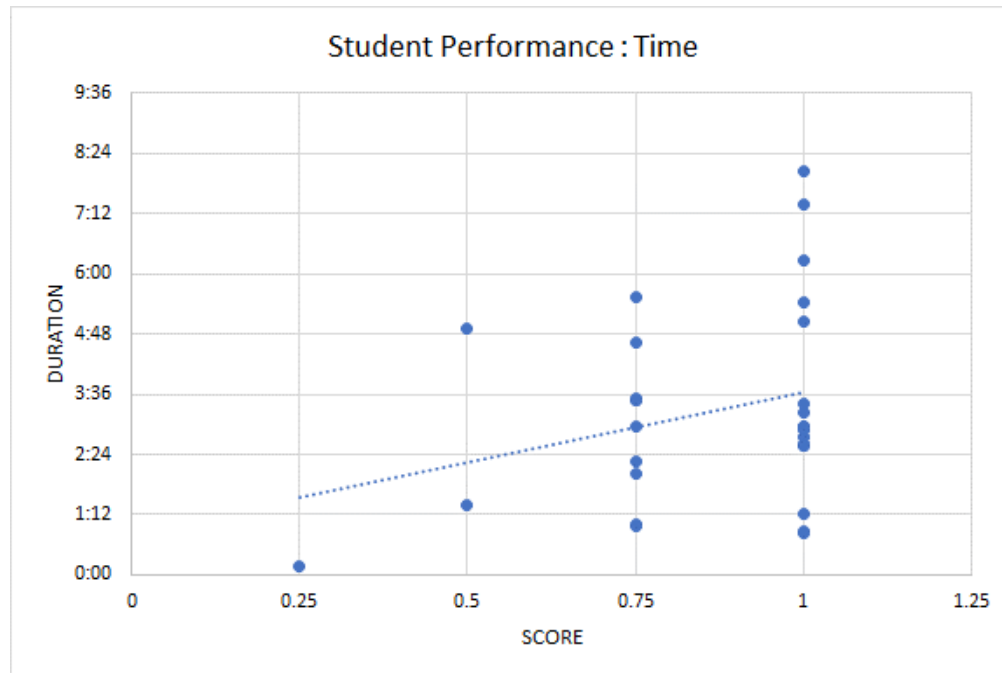


Figure 4.1.2: Individual Student Performance Post-Style



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Figure 5: Student Performance Compared to the Time it took to Complete the Survey



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