

## **Overview of a Financial Literacy Course for Incoming Engineering Students at a Hispanic Serving Institution**

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# **“Work-in-Progress: Overview of a Financial Literacy Course for Incoming Engineering Students at a Hispanic Serving Institution”**

## **Abstract**

This Work in Progress paper discusses a financial literacy course offered in an introductory engineering course to prepare freshman students on personal finance and money management. The Yes, SHE Can! program from The University of Texas at El Paso (UTEP) developed the financial literacy course, which generally consists of an introduction module, five learning modules on key topics related to financial literacy, and a final project. Students were exposed to finance and money management related topics such as cash flow, budgeting, savings accounts and strategies, investments, retirement accounts, and work-force benefits. Access to the introductory engineering course, which had a total of 23 students enrolled during the first implementation, was provided by a faculty member from the UTEP Engineering Leadership and Education Department. Students were allowed to complete the financial literacy learning modules progressively at their own time throughout the spring 2022 semester. A pre-semester survey was sent to the students to have a baseline of students’ knowledge of personal and college related financial management. The students’ participation in the learning modules and final project was analyzed to determine the preliminary impact of the first implementation of the financial literacy course. From this study, students showed interest in learning more about personal finance and money management, and actively participated in the financial literacy course implemented for the introductory engineering class.

## **Introduction**

A solid working knowledge in financial literacy is a critical factor in students’ success, especially for underrepresented minority (URM) students in science, technology, engineering, and math (STEM) disciplines (see examples, [1] thru [4]). This is particularly important with the recent impacts of the pandemic on the national economy, the changing landscape of the job market, as well as the global economic crisis. Students’ financial literacy will help them make sound decisions to succeed professionally in their career paths. Unfortunately, traditional university curricula do not expose students, particularly those in engineering programs, to personal finance and money management learning environments in a timely manner, which is vitally important among engineering students of today [5]. Previous studies highlight engineering students’ agreement that financial literacy skills are important. Likewise, they believe and feel very confident that they have those skills given their numeracy skills [6] [7]. However, the results of these studies on whether engineering students really have a good financial literacy education to sustain them into adulthood is mixed [7]. If engineering students realize that they may not understand personal finance and money management as well as they think they do, and that the need to know is critically important, then the decision to seek financial literacy knowledge and skills may become greater. This may result in an urgency for early and more opportunities to learn about personal finance and money management skills at the university level [8].

The National Financial Capability Study (NFCS) in 2021 outlines the need to support financial literacy [9]. This study shows the differences in financial capability among demographic groups, and those groups with lower incomes, lower education levels, and underrepresented demographics showed higher levels of vulnerability across multiple measures of financial capability [9]. This study helps us to understand the critical need for financial literacy and, in taking this one step further, we also consider Thomas and Subhashree’s [7] findings that financial knowledge, financial attitude, parental influence, and peer group influence have a direct and positive influence on financial literacy levels among engineering undergraduate students. Considering the differences in financial capabilities and the key factors that can influence financial literacy of engineering students, specifically URM groups, offering engineering students opportunities to learn and understand financial literacy and money management concepts should be done early in their academic programs.

Introductory university courses are key learning environments during which entering students, regardless of their academic majors, can be equipped with knowledge and skills on complementary topics such as personal financial management [10]. The introduction of students to their chosen STEM field of study is a major step toward enriching their academic identity development (e.g., [11], [12], and [13]), expressly for URM students who most often do not have direct access to STEM role models and social and financial support systems [14] [15]. Similarly, introductory university courses can be strategically designed to positively influence the academic preparedness and motivation of students to succeed along their chosen careers (e.g., [10], [16], [17], and [18]). Moreover, the curriculum design of introductory university courses should incorporate learning opportunities that are meaningful and can fulfill the needs and challenges of the targeted student population; in this case, to develop their finance and money management skills.

Through the support of an ongoing research program sponsored by the U.S. Department of Education (DoEd), the Yes, SHE Can! team examined the implementation of a financial literacy course for entering engineering students. The course was offered as part of the curriculum of an introductory engineering course titled “Critical Inquiry.” The UTEP Yes, SHE Can! team designed, developed and implemented the financial literacy course and monitored the learning experience of entering engineering students.

### **Objective and Scope of Work**

The objective of this study is to document the first implementation of a financial literacy course for engineering students enrolled in an introductory university course. This paper provides an overview of the UTEP Yes, SHE Can! Program followed by a description of the financial literacy course. A discussion section presents information on the need for financially literate URM graduates, the preliminary impacts from the financial literacy learning modules, and the lessons learned from first implementation of this financial literacy course. Finally, conclusions and recommendations drawn from this study are offered.

### **Methodology**

#### *Overview of Education Program*

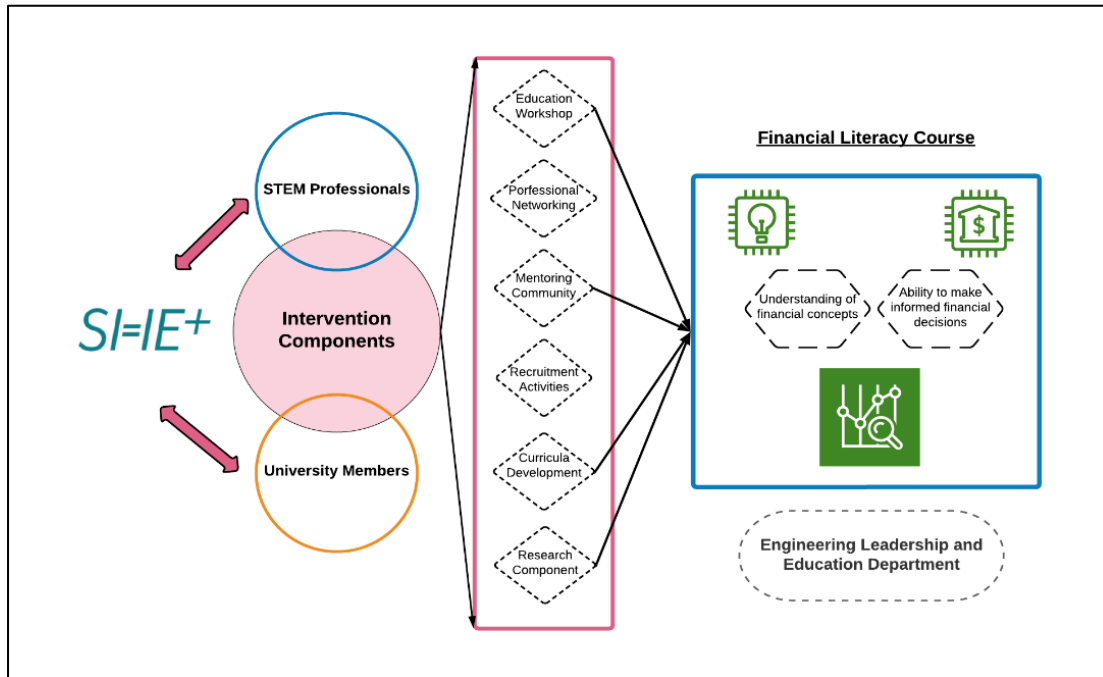
The UTEP Yes, SHE Can! program was established with support from the U.S. DoEd to enhance the career decision-making of minority and especially Hispanic female students interested in STEM. This education program aims to develop and implement new education models, engagement techniques, mentoring approaches, professional development opportunities, and career pathways through a multi-pronged education intervention. The six main intervention components of this program are 1) STEM Education Workshops, 2) Mentorship Community, 3) Research Component, 4) Recruitment Activities, 5) Professional Networking, and 6) Curricula Development. The goal is to close the education gap for minority and especially Hispanic female students in STEM while promoting the use of effective and innovative interventions that can strengthen the STEM pipeline for minority students to succeed as professionals. Figure 1 provides an overview of the education program, contributors, intervention components, and the interaction to implement the Financial Literacy Course through an introductory engineering class.

#### *Intervention for Introductory Engineering Class*

To implement a Financial Literacy course for our undergraduate students, the Yes, SHE Can! program collaborated with a faculty member of the UTEP Engineering Leadership and Education Department to have access to an introductory engineering class. The introductory engineering class, titled “EL 1301 Critical Inquiry,” exposes undergraduate students to educational activities on critical engineering thinking, leadership development, teamwork competencies, and social and professional responsibilities. The incorporation of the Financial Literacy course as a complementary educational activity was considered suitable given the transformative and exploratory teaching space and learning environment of this introductory engineering class.

#### *Characteristics of Students from Introductory Engineering Classes*

The Financial Literacy course was implemented during the Spring 2022. The EL 1301 class had an enrollment of 23 undergraduate students from which 15 were freshman, 2 were sophomore, and 6 were juniors. In addition, 16 students identified as male and 7 identified as female students, which represent 70% and 30%, respectively, of the total number of students enrolled.



**Figure 1: Overview of Education Program and Partnership for Financial Literacy Course Implementation**

*Description of Financial Literacy Course*

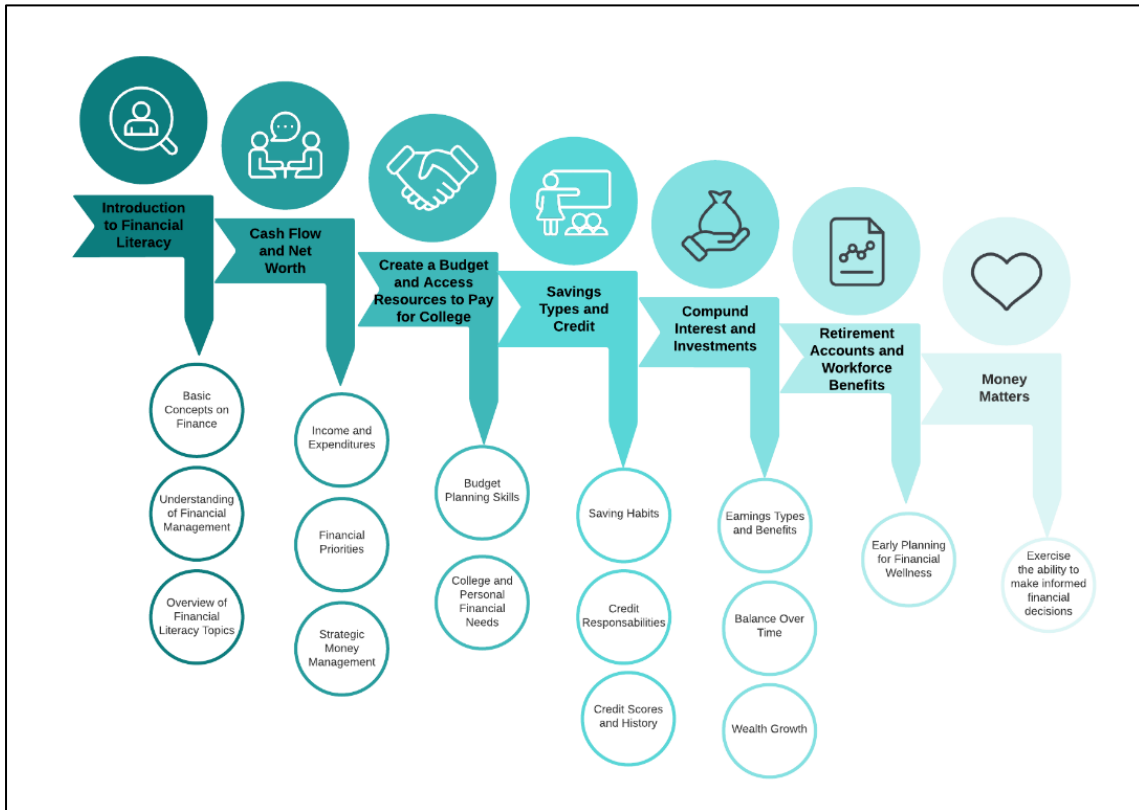
The Financial Literacy course was implemented to achieve two objectives for our entering engineering students: 1) increase understanding of financial concepts, and 2) to make informed financial decisions. The Financial Literacy course consisted of six main learning modules and a final project as shown in Figure 2. Each module provides a topic video created by peers and near peers, gamification, and a discussion board. Module 1 was an introduction to financial literacy and provided information for students to learn basic finance concepts and understand the importance of financial management in different aspects of the students’ lives. Students learned about cash flow and net worth during Module 2. In Module 3, students studied how to create a budget and learned about resources to pay for college expenditures. Modules 4 and 5 focused on savings types and use of credit as well as compound interest and investments, respectively. Module 6 enabled students to learn about retirement accounts and workforce benefits. The final project, Money Matters, consisted of an exercise for students to test their ability to make informed financial decisions. After completing the assignments associated with each Learning Module, students were tasked to participate in a discussion board to share their learning experience from the corresponding module. For this work-in-progress paper, the participation and performance of the students were examined to preliminarily assess the first implementation of the Financial Literacy course.

**Discussion**

*The Need for Financially Literate Graduates*

The implementation of the Financial Literacy course began by evaluating the knowledge of the students on personal finance related topics. As such, a pre-semester survey was distributed among the undergraduate students. Question one asked students about their level of agreement with how they manage their finances for personal expenditures (including phone, car, housing, food, utility bills and savings). Figure 3a shows

the students' feedback on the posed question. From these results, approximately 87% of students feel knowledgeable about their personal financial management, while 13% of the students responded “strongly disagree” or “disagree” meaning that they do not feel knowledgeable about personal financial management. Students were then provided a similar question, but this second question focused on the students' knowledge to pay for college related expenditures. The responses from the students are depicted in Figure 3b. Again, most of the students responded positively to this question with 74% of the students feeling strong about financial management for college related expenditures. Only 13% of the students responded “strongly disagree” or “disagree” signifying that their knowledge of financial management for college related expenditures might be low.



**Figure 2: Learning Modules and Topics for Financial Literacy Course**

In addition, students were asked to provide their sources of information when it comes to learning about how to manage money and expenditure. Figure 4 reports the students' feedback from this question. Family was the most voted source of information with 70% of the students selecting this source. 35% of the students selected social media as a source of information on financial management related knowledge followed by friends, banking institutions, and YouTube as selected by 30% of the students. Co-workers, as a source of information, were selected by 30% of the students, and financial aid office, financial websites and books were the sources of information least voted (with only 17% of students).

The results from these three preliminary questions aligned with the findings from previous research [6] and [7]. The confidence of the students on financial management related knowledge could be directly attributed to the support from the students' family members, particularly when it comes to college expenditures. However, many of these students are about to experience a significant transformation in their lives, this means that they are close to completing an academic degree and obtaining their first professional position, and their financial responsibilities will change considerably.

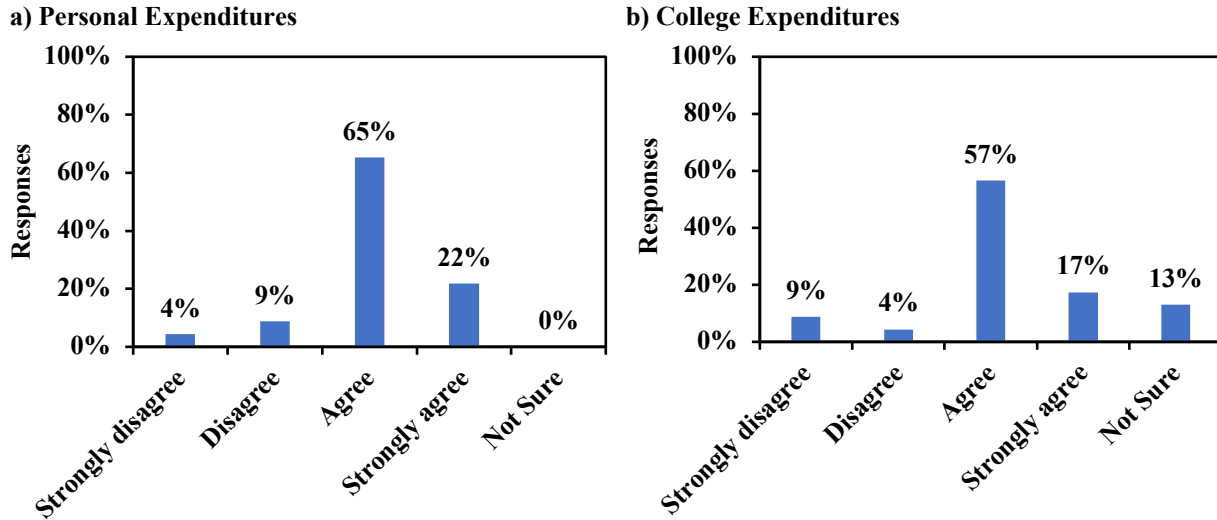


Figure 3: Student's Confidence on Financial Management Responsibilities

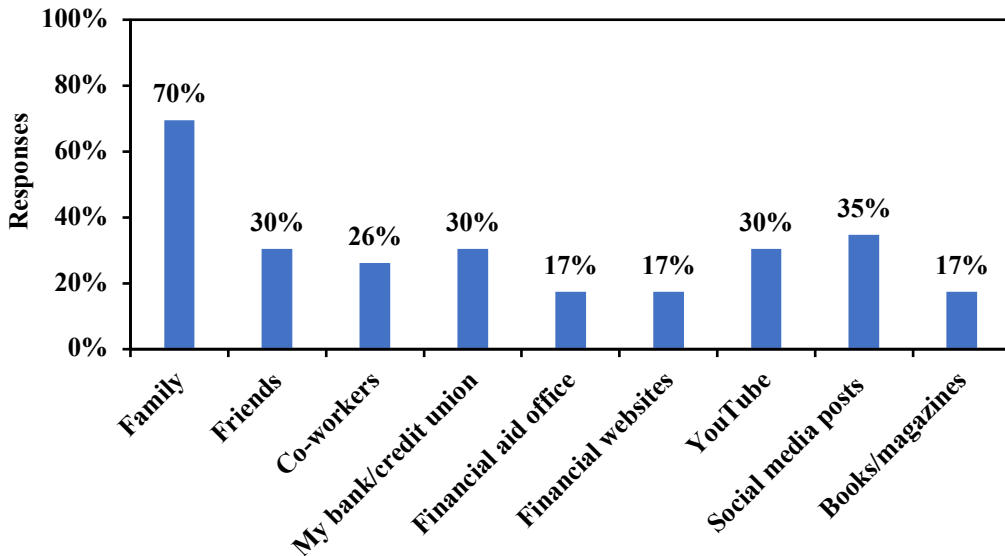


Figure 4: Student's Most Used Sources of Financial Management Information

In addition to the preliminary information collected from our pre-semester survey, we looked at the 2020-2021 Graduating Senior Survey distributed by the UTEP Center for Institutional Evaluation, Research and Planning (CIERP) to examine the financial conditions of our undergraduate students in general. From a total of 3,910 graduating senior students, approximately 1,624 students completed the survey, a response rate of approximately 41.5%. Graduating senior students were asked about how UTEP has contributed to the students' ability to manage personal finances. While most of the students felt adequately prepared to manage personal finances, approximately 30% of the students responded that they felt less than adequately prepared on managing personal finances. Although students were not asked about the college resources used to learn about managing personal finances during college, it must be emphasized that most curricula do not include courses on personal finance and money management related concepts. Therefore, it was concluded that implementing a financial literacy course during an introductory engineering course would significantly contribute to the preparation of students on finance related concepts at an early academic stage.

*Students' Performance on Financial Literacy Learning Modules*

A summary of students' performance and participation during the Financial Literacy course is provided in Table 1. Students' completed assignments for each learning module. These assignments were scored, and the scores were used to initially assess the implementation of the Financial Literacy course. The maximum score was 50 points for each assignment. Statistical parameters such as the average, median, maximum, first quartile, third quartile, and minimum were computed to better describe the distribution the assignments' scores from each learning module. In addition, the number of students that completed the assignment and the number of students that participated in the discussion board are reported in Table 1.

From this information, most of the students obtained the maximum score for Module 1 assignment with only six students receiving a score of 45 points, which is still considered a good score. For Module 1, 22 students completed the assignment but only 20 students participated on the discussion board. Similarly, most students did very well on Module 2 with only two students receiving a score of 40 points while two students did not complete the assignment and received a score of 0 points. 18 students participated on the discussion board for Module 2.

**Table 1: Summary of Assignments Completed and Participation in Discussion Boards**

Statistical Parameter	Learning Module					
	Introduction to Financial Literacy	Cash Flow and Net Worth	How to Create a Budget and Access Resources to Pay for College	Savings Types and Credit	Compound Interest and Investments	Retirement Accounts and Workforce Benefits
Average	48	45	37	40	34	34
Maximum	50	50	50	50	50	50
3rd Quartile	50	50	50	50	50	50
Median	50	50	50	50	40	45
1st Quartile	47	50	26	48	35	9
Minimum	45	0	0	0	0	0
Number of students that completed						
Module assignment	22	20	17	18	17	16
Module discussion board	20	18	16	15	14	14

After Module 2, we noticed an overall decrease in students' completion of assignments and participation in the discussion boards. Only 17 students completed the assignment for Module 3. While more than 50% of the students obtained the maximum score, 5 students received scores between 45 and 49 points, 1 student received a score of 20 points. The 5 students that did not complete the assignment received 0 points score. From the 17 students that completed the assignment, 16 participated on the discussion board. For Module 4, the 18 students that completed the assignment did very well except for 1 student that received 40 points. Modules 5 and 6 exhibited more students receiving scores between 30 and 40 points although a good percentage of the students scored 50 points. Yet, these two modules exhibited the lowest participation of students in the discussion boards.

The scores from the Final Project were also collected and analyzed. Students could receive a maximum of 100 points for the Final Project. Two students scored 100 points on their final projects, two more students

received scores greater than 90 points, and a student obtained 83.3 points. Seven students scored less than 80 points with two of these students receiving a score of 63, which were the lowest scores besides those who did not complete the final project. Ten students did not complete the Final Project and scored 0 points.

### *Preliminary Observations from Financial Literacy Course*

The information reported on the students' assignments and the comments from the discussion boards were partially analyzed to extract conclusions and key learning experiences of the students. In addition, some of the comments from the students are reported and discussed next:

- When asked about the definition of financial literacy and the aspects of financial literacy that were of more interest to the student during Learning Module 1, students gave a variety of well-rounded responses as to what is financial literacy to them. Students identified that financial literacy is generally a set of skills, ideas, and habits. A student commented, "Financial Literacy is the knowledge or experience a person has when dealing with budgeting, investments, and planning for the future. I am most interested in the investments part of financial literacy. Making an investment that could eventually grow and aid in my retirement in the future sounds very appealing to me. Another student stated that "Financial literacy is about teaching you money arrangement. Growing up I did have to learn a lot on my own about finances and one of the main difficulties that I still face today is with building credit. I have yet to start a credit at the age of 20. Part of me doesn't find it useful for the time being but I know at some point I will need it. My fear with credit is that I simply don't know where to start and/or how to apply and where to apply." This comment shows an example of an aspect of financial literacy that our undergraduate students may need help to improve their personal finance and money management skills.
- When students were asked about cash flow and net worth from a business perspective for Learning Module 2, students were able to identify strategies that could result in greater income in a particular scenario. For example, a student proposed a low interest loan to improve the security system of the business after merchandise was stolen. Another student reflected that it was better to look for lower cost options or to rent another studio for the business instead of lowering the quality of the product being sold. Another student proposed to slightly increase the price of the products but to implement a rewards program to retain those regular customers.
- Students recognized the importance of understanding personal and family finance conditions to make a better decision in terms of paying for college. For Learning Module 3, students were tasked to analyze the expenses related to college. They looked at the college tuition associated with the three universities they would like to consider obtaining a bachelor's degree. One student recognized the importance of searching and analyzing the costs associated with college tuition and other expenses to make informed financial decisions. Another student stated, "This information helped me really weigh out my option to opt out of the choices that may not be in my price range to attend to. This helped me learn that there are also all kinds of resources that could've really helped me in terms of a decision that would affect me for arguably the rest of my life. It also let me know that I chose the best decision for me and my own personal situation." Students also highlighted the importance of creating a budget, particularly for college life. They defined budgeting skills as important to understand their financial possibilities to satisfactorily pay for college expenses.
- In Learning Module 4, students reflected on money related advice from an adult and evaluated cost of living and typical purchases they have recently done. A student said that the advice received was "know what you are spending your money on" and then she stated that a home gym that bought during the pandemic was a purchase that she regrets now. Another student mentioned that the advice was to focus on saving money. This student also mentioned that accepting loans is a financial decision that he regrets now and is addressing satisfactorily by budgeting effectively and learning about personal finance. Students analyzed their cost of living as part of putting their budgeting skills in practice and what expenses could be optimized to have a more stable financial condition.



- During Learning Module 5, students were asked to explain the stock market and the situation with Game Stop to someone who does not know anything about the topic. Students reflected on how unexpected changes could affect one's financial condition such as the impacts from the pandemic and the market crisis. A student compared the stock market with the changes on the price of gas and mentioned that the stock market is very challenging and hard to tell when you will lose or gain money. Another student stated that the pandemic played a big part in the Game Stop stock market situation and mentioned that people learned about stocks during this time and developed a new source of income through the stock market. One more student stated, "This incident could open up a new type of financial warfare between the middle class and the hedge funds who make money off of the hardships of regular everyday hardworking people."
- For Learning Module 6, students were asked about their preferences on a type of retirement account and what pros and cons they see in the selected retirement account type. Most students picked a ROTH IRA account. A student commented that "once you do your withdrawal (from a ROTH IRA) you don't have to pay any taxes so all that money would be your own "saving" per say." This aspect of ROTH IRA was mentioned by most of the students that selected this type of retirement account. Another student recognized that the ROTH IRA was the best fit for him, and the pro was the flexibility to pick the company he can broker with. A few more students preferred to use a traditional 401k account and made this decision based on their familiarity of this account type. Overall, students learned why a retirement account should be opened early in their lives and what would be the difference in benefits if they wait longer.

### **Summary**

The implementation of a financial literacy course offered in an introductory engineering course to prepare mostly freshman students on personal finance and money management was examined and discussed in this paper. The UTEP Yes, SHE Can! program developed the financial literacy course, which included an introduction module, five more learning modules on key topics related to financial literacy, and a final project. From the information collected and preliminary analyses of the students' completion of assignments and participation on discussion boards, the following conclusions were drawn:

- Entering engineering students reported to feel very confident on topics such as personal finance and money management as well as financial resources to pay for college. This confidence level of entering students was also reported by previous research studies on similar research topics.
- Family was the most voted source of financial management information followed by social media posts, banks and credit unions, YouTube, and friends.
- Proper training on financial literacy would support the financial confidence among students, particularly Hispanic engineering students, and subsequently empower them to fully explore their future professional career options and strategically use their income as professionals.
- Implementation of interventions, such as the Financial Literacy Course, in introductory university courses could maximize the learning experience and quality of entering students.
- Approximately 72% of the students completed the financial literacy course successfully. These students that consistently participated in the Financial Literacy course showed a good understanding of personal finance and money management and obtained the highest scores among the students enrolled in the introductory university class.
- Module 3 "How to Create a Budget and Access Resources to Pay for College" and the Final Project exhibited the lowest scores as well as a relatively low participation and completion rates from the students.

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## References

- [1] Chen, H., and R.P. Volpe. (1998) "An analysis of personal financial literacy among college students." *Financial Services Review* 7 (2).
- [2] Davidson, I. B. (2006). "Financial literacy important for future." *Montana Business Quarterly*, 44(3), 22."
- [3] Lantara, I Wayan Nuka, and Ni Ketut Rai Kartini. (2015) "Financial literacy among university students: Empirical evidence from Indonesia." *Journal of Indonesian Economy and Business* 30 (3).
- [4] Kwenda, F., & Sihlongonyane, S. (2021). "An Analysis of Personal Financial Management Practices Among First-Year Students at the University of Eswatini," *The Journal of Accounting and Management*, 11(3).
- [5] Lusardi, A., and O. Mitchell (2014) "The Economic importance of financial literacy: Theory and evidence." *Journal of Economic Literature* 52 (1): 5-44.
- [6] Ulstad, A. T., Mashayekhi, M., & Meckstroth, H. (2018, June). Work in Progress: Do Engineering Students Gain Financial Literacy Skills by Taking an Engineering Economy Course? In *2018 ASEE Annual Conference & Exposition*.
- [7] Thomas, B., & Subhashree, P. (2020). "Factors that influence the financial literacy among engineering students." *Procedia Computer Science*, 172, 480-487.
- [8] LaBorde, P. M., Mottner, S., & Whalley, P. (2013). "Personal financial literacy: Perceptions of knowledge, actual knowledge and behavior of college students." *Journal of Financial Education*, 1-30.
- [9] Lin, J. T., Bumcrot, C., Mottola, G., Valdes, O., Ganem, R., Kieffer, C., Lusardi, A., & Walsh, G. (2022). "Financial Capability in the United States: Highlights from the FINRA Foundation National Financial Capability Study (5th Edition)." FINRA Investor Education Foundation. [www.FINRAFoundation.org/NFCSReport2021](http://www.FINRAFoundation.org/NFCSReport2021)
- [10] Garcia, V., Golding, P., Golding, D., Torres-Catanach, I., Cuvelier, N., Cholewa, C., & Mendoza, K. A. (2022, August). "A Strategic Curriculum Design for an Introductory Engineering Course to Encourage Self-Empowerment of Minority Students." In *2022 ASEE Annual Conference & Exposition*.
- [11] Ratcliffe, M., Woodbury, J., & Thomas, L. "Improving motivation and performance through personal development in extensive introductory software engineering courses." In *Proceedings 15th Conference on Software Engineering Education and Training (CSEE&T 2002)* (pp. 108-115). IEEE. 2002.
- [12] Budny, D., Paul, C., & Newborg, B. B. "Impact of peer mentoring on first-year students engineering students." *Journal of STEM Education: Innovations and Research*, 11(5). 2010.
- [13] Schauss, N. A., & Peuker, S. "Improving student success and retention rates in engineering: one year after implementation." In *Proceedings of 2014 FYEE Annual Conference*. 2014.
- [14] May, G. S., & Chubin, D. E. "A retrospective on undergraduate engineering success for underrepresented minority students." *Journal of engineering education*, 92(1), 27-39. 2003.
- [15] Adams, E. A., Dancz, C. L. A., & Landis, A. E. "Improving engineering student preparedness, persistence, and diversity through conative understanding." In *2015 ASEE Annual Conference & Exposition* (pp. 26-915). 2015.
- [16] Pejcinovic, B., Holtzman, M., Wong, P. K., & Recktenwald, G. "Assessing student preparedness for introductory engineering and programming courses." In *2017 IEEE Frontiers in Education Conference (FIE)* (pp. 1-5). IEEE. 2017.
- [17] Samsuri, N. S., K. Mohd-Yusof, & A. A. Aziz. "Enhancing the First Year Engineering Student Motivation through an Introductory Engineering Course." In *2017 7th World Engineering Education Forum (WEEF)* (pp. 349-354). IEEE. 2017.
- [18] Garcia V. M., D. E. Golding, I. Torres-Catanach, C. Cholewa, H. Geller, G. Moreno, & P. Golding. "Understanding Career Identity Development and Preparedness of Freshmen Students to Leverage Convergence in Engineering Education." *2021 IEEE Frontiers in Education Conference (FIE)*. pp. 1-4. 2021. doi: 10.1109/FIE49875.2021.9637333.