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4IS AND 4YS: UNDERSTANDİNG SİNKİNG FUND AND AMORTİZATİON SCHEDULE TO ENHANCE FİNANCİAL LİTERACY SKİLLS AMONG GRADE 11 STUDENTS

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ABSTRACT

This study aimed to enhance senior students' financial literacy, specifically in the areas of sinking funds and amortization, through an intervention known as the 4Is and 4Ys, which follows a scaffolding approach. The research employed a quantitative method using a one-group pretest-post-test design, a type of pre-experimental approach where the same group of participants is assessed before and after the intervention (Fraenkel et al., 2015). Prior to the intervention, students recorded an overall mean score of 25% in the pretest, indicating poor financial literacy skills. After implementing the intervention, the posttest results showed a significant improvement, with an overall mean score of 90.75%, suggesting a highly effective impact of the 4Is and 4Ys strategy on students' learning outcomes. The data, as presented in the results table, reflect a marked difference in the performance of 20 students in computing sinking funds and amortization. This notable improvement demonstrates the effectiveness of the intervention in helping students build foundational knowledge and apply complex financial concepts more confidently. Initially, students struggled with these topics, showing limited understanding and skills. However, following the structured and supportive learning process offered by the 4Is and 4Ys approach, their performance improved considerably. These findings highlight the value of targeted instructional strategies in addressing specific learning gaps among students. Moreover, results showed that students performed better in the post-test than the pre-test, implying a significant difference between the two test scores, $t(19) = 23.2$, $p<.001$, with a standardized effect size of Cohen's $d=5.18$. Since the probability value ($p < .001$) is less than the level of significance ($a = 0.05$), the null hypothesis is rejected. The rejection is supported by having a standard deviation of 2.54, indicating the reliability of the mean. This means that there is a significant difference between the pretest and post-test scores. In the qualitative phase, the researchers gained insights about the positive outcome of the intervention together with the challenges faced by the students. The study concludes that scaffolding methods like 4Is and 4Ys can significantly contribute to developing senior high schoolh students' financial literacy, making complex topics more accessible and enhancing their problem-solving abilities in real-life financial situations

KEYWORDS: *Amortization Schedule, Financial Literacy Skills, Inferential Statistics, Mixed Methods, Sinking Fund Schedule, Senior High School, 4Is and 4Ys Intervention, Philippines*

INTRODUCTION

When presented with inevitable agreements, bills, or loans, as well as real-world financial mathematics issues based on sinking fund and amortization schedule principles, many students struggle to understand proper financial literacy when dealing with these things (Nawir Yuslem et al., 2023). In financial problems, there are two concepts to consider: amortization, which involves repaying a loan in specified payments over time, and sinking funds, which are funds set away on a regular basis to cover future needs. Understanding these principles of financial mathematics is critical for avoiding ignorance when students face similar problems independently (Szekeres, 2024). However, a number of students struggle to understand amortization schedules and sinking funds, making it difficult to apply these principles effectively (Brechner & Bergeman, 2020).

In Colombia, a study revealed that 75% of participants indicated a low financial literacy from struggling to distinguish between sinking funds and amortization schedules, as well as to understand the appropriate formulas and the related information, highlighting a significant gap in financial literacy among students (Hurtado et al., 2022). In Poland, research showed a clear demand for improved understanding in essential financial areas such as budgeting, emergency funds, balancing risk and reward, and planning for retirement or long-term savings, indicating that many students lack foundational knowledge in personal finance (Czech et al., 2024). In Moscow, students were found to have fragmented knowledge of financial institutions and faced difficulty grasping the rights of consumers in financial services. Many lacked proper models for interacting with financial organizations, further emphasizing the disconnect between students and practical financial literacy (Berezin, 2020). This indicated that in the general context, these findings collectively reveal an urgent need to address the

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widespread issue of low financial literacy through targeted educational strategies that uncover contributing factors and offer practical, sustainable solutions.

In the Philippines, local studies highlight consistently low levels of financial literacy among students. In Laguna, more than half of the respondents (52.40%) demonstrated limited financial knowledge, particularly in making informed spending decisions, most notably, their ability to assess whether they can afford a particular item before purchasing it (Indefense & Yazon, 2020). In Samar, the financial literacy level among 228 student respondents was also very low, with a transmuted mean rating of 2.34, equivalent to a score of 46.8 out of 100. The study found a strong positive relationship between students' financial literacy and two key factors: academic ability and parental guidance (Lalosa, 2020). Meanwhile, in Cebu, financial literacy levels remain alarmingly low, largely attributed to inadequate financial education during childhood that extends into adulthood. Although saving behaviors have shown some improvement, the national saving rate remains under 10%, indicating that many still lack effective financial habits (Balaza et al., 2021). These findings indicated the urgent need for targeted financial education that begins early and takes into account both academic and family influences to foster build financial competence among Filipino students.

In the Division of Davao del Norte, particularly at Sampao Integrated School, students were introduced to the concepts of sinking funds and amortization schedules as part of their learning period in financial mathematics. Despite being exposed to these topics through classroom instruction, their performance in a subsequent summative assessment revealed significant challenges, as all students obtained low scores. Further analysis of the results and observations during the lessons indicated that the students encountered substantial difficulty in understanding, utilizing, and interpreting the numerous formulas associated with these concepts. The technical nature of the subject matter appeared to overwhelm them, leading to confusion and misapplication of the mathematical procedures required. As a result, their ability to accurately solve problems and demonstrate conceptual understanding was noticeably hindered, pointing to a gap in foundational comprehension and the need for more supportive, scaffolded instructional strategies.

The most essential learning competencies learning sinking funds and amortization scheduling for senior high school students are designed to prepare them for future collegiate endeavors. Understanding these concepts are fundamental, as it forms a significant part of the curriculum across various courses. This knowledge lays the groundwork for handling major courses and ensures students' readiness for real-world applications. Developing these skills is essential for students, as it enables them to engage effectively in economic activities and make informed financial decisions when interacting with businesses in society.

In review, there were related studies that discuss financial literacy and mathematical applications in finance, yet few focus on students' understanding of amortization and sinking funds. For instance, the study of Brechner (2020) titled "Contemporary Mathematics for Business and Consumers" emphasizes the importance of applying mathematical concepts in business contexts to improve decision-making. However, the study does not specifically explore how students comprehend or apply amortization and sinking funds in foundational learning environments. Similarly, Akan (2022), in his book "Fundamentals of Finance: Investments, Corporate Finance, and Financial Institutions," presents various financial tools and concepts intended for advanced learners, but does not address how to introduce these concepts effectively to students at the basic or intermediate level. Lastly, Czech et al. (2024), in their study "Financial Literacy: Identification of the Challenges, Needs, and Difficulties among Adults Living in Rural Areas," aimed to identify financial literacy gaps among rural adults and improve their knowledge through an intervention. However, this study is adult-focused and does not cater to the learning challenges of students, particularly in understanding amortization and sinking funds. Despite the existence of the mentioned studies, the researchers propose a new and focused approach to address this by developing an intervention that simplifies and enhances the understanding of amortization and sinking funds. This approach highlights the significance of the present study in contributing a relevant and targeted solution to an underexplored area of financial education.

Research Questions

The research questions below investigated reasons on how to address the financial literacy skills of grade 11 students. 4Is and 4Ys will be the intervention for the learners to address this problem. The research questions that guided this study are the following:

1. What is the level of grade 11 students' financial literacy skills before the 4Is and 4Ys intervention?
2. What is the level of grade 11 students' financial literacy skills after the after the 4Is and 4Ys intervention?
3. Is there a statistically significant difference in the financial literacy skills of Grade 11 students before and after the implementation of the 4Is and 4Ys intervention?
4. What insights about 4Is and 4Ys intervention grade 11 students can share to the academe?

Proposed Intervention

The 4Is and 4Ys intervention is a scaffolding-like approach. Including the pre-test and post-test, there were a total of six sessions in which the participants and researchers met.

Session 1 (Pre-test and Orientation)

During this initial session, the students were briefed on the scope, objectives, and flow of the intervention. They were informed about the *what*, *where*, *when*, and *how* of the seminar, ensuring they clearly understood what was expected of them. A short open forum followed, where questions and concerns were addressed. After the orientation, the participants took the pre-

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test, which gauged their prior knowledge of financial mathematics, particularly focusing on sinking funds and amortization schedules. This diagnostic tool helped identify the students' baseline understanding before the actual intervention.

Session 2 (I do, You watch)
This session introduced students to the key concepts of sinking funds and amortization schedules. The researcher or teacher modeled how to solve problems involving these topics, explaining the definitions, purposes, and practical uses of each. Students observed as the teachers demonstrated step-by-step procedures for constructing sinking fund and amortization tables using Microsoft Excel. The teacher worked through various examples slowly and thoroughly, ensuring students could visually follow each step without needing to respond or act just yet. Emphasis was placed on understanding the structure and logic behind each financial tool.

Session 3 (I do, You help)
In this session, students began to engage more actively. The teachers (researchers) still led the activity but invited student participation in each step of the process. For example, after showing a few rows of an amortization schedule, the teacher asked students to calculate the next row or input certain formulas into Excel. The students were encouraged to offer answers, make suggestions, and ask clarifying questions as the teacher guided them through the tasks. This collaborative effort aimed to build student confidence and deepen their understanding while still providing strong teacher support.

Session 4 (You do, I help)
By this stage, responsibility shifted toward the students. Working either individually or in small groups, they constructed sinking fund and amortization tables on their own using Microsoft Excel. The teacher circulated and provided scaffolding as needed, answering questions, offering hints, and guiding students who encountered difficulties. This phase allowed learners to apply what they had observed and practiced in previous sessions while still having the safety net of teacher support. The goal was to develop independent problem-solving skills while refining their grasp of the topic.

Session 5 (You do, I watch)
This session was the transition to full learner independence. Students were tasked with solving new problems on their own and creating complete sinking fund and amortization schedules using Excel without assistance. The teacher observed quietly, only stepping in if absolutely needed. This allowed students to demonstrate mastery of the skills and apply everything they had learned throughout the intervention. It also provided the facilitator with informal assessment opportunities based on student performance.

Session 6 (Post-test)
In the final session, students completed a post-test to measure the improvement in their knowledge and skills compared to the pre-test. This summative assessment included both computational and conceptual questions related to the topics covered.

Table 1. Matrix of the 4Is and 4Ys Intervention

Session	Title	Activity Description	Method	Objective	Materials
1	Pre-test and Orientation	Orientation on intervention flow, objectives, and expectations; followed by a diagnostic pre-test	Briefing, Open Forum, Pre-Test	To orient students and assess their baseline knowledge on sinking funds and amortization	Printed pre-tests, PowerPoint presentation, pen/paper
2	I Do, You Watch	Teacher demonstrates solving problems and constructing tables using Excel; students observe	Direct Instruction, Demonstration	To introduce key concepts and allow students to visually follow procedures	Laptop, projector, Excel file samples, handouts
3	I Do, You Help	Teacher leads problem-solving with student input; students assist using Excel	Guided Practice	To involve students in solving tasks while still receiving strong teacher support	Laptops/PCs, projector, printed guides
4	You Do, I Help	Students work in groups or individually to construct tables in Excel; teacher provides support	Collaborative/ Independent Work	To develop independent skills with scaffolded teacher guidance	Laptops/PCs, Excel templates, calculator, handouts
5	You Do, I Watch	Students independently solve new problems and create full schedules in Excel; teacher observes	Independent Performance	To assess student mastery and independence in applying learned skills	Laptops/PCs, task sheets, Excel
6	Post-test	Students complete a post-test assessing their knowledge and skills	Summative Assessment	To evaluate learning gains and improvements from the intervention	Printed post-tests, pen/paper

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METHODS

Study Design

This study utilized a quantitative research method with a one-group pretest-post-test design, which is a type of pre-experimental approach. In this design, the same group of participants is evaluated at two different times: before (pretest) and after (posttest) the intervention. The goal is to measure changes resulting from the intervention by comparing the initial (baseline) and final (end-line) values. Unlike experimental designs, pre-experimental designs do not have a control group for comparison; instead, they focus on observing changes within a single group over time. Any differences between the baseline and end-line values are attributed to the intervention, suggesting its effect on the outcomes (Fraenkel et al., 2015).

In this study, the one-group pretest-post-test design was employed to evaluate the effectiveness of 4Is and 4Ys as an intervention to enhance the financial literacy skills among Grade 11 students. By assessing students' financial literacy skills before and after incorporating the scaffolding-like intervention, the study aimed to determine whether these interventions lead to meaningful improvements. The design focuses on changes within the same group of students, with pretest and posttest results offering a direct comparison of their financial literacy skills, attributing any differences to the intervention. This approach is appropriate for the study as it aims to measure the direct impact of 4Is and 4Ys intervention on students' financial literacy skills.

Population and Sample

The respondents of this study were purposively selected Grade 11 students from Sampao Integrated School. A total of 20 students were chosen based on their accessibility and relevance to the study's objectives. The researchers deliberately selected Grade 11 learners as the intervention focused on financial literacy concepts appropriate to their academic level and life stage. This age group is at a crucial point in developing practical skills needed for real-world financial decision-making.

Purposive sampling was employed to ensure that the participants had characteristics aligned with the research goals—specifically, the need to improve financial literacy skills among senior high school students. According to Palinkas et al. (2015), purposive sampling is effective in qualitative and intervention-based research where participants are selected based on their ability to provide meaningful data relevant to the phenomenon being studied.

The study aimed to strengthen students' understanding of key financial concepts such as budgeting, saving, loans, and amortization through the 4Is and 4Ys intervention. Recognizing financial literacy as a critical 21st-century skill, the researchers targeted students who could benefit the most from this focused instruction. By the end of the intervention, it was expected that these Grade 11 students would demonstrate measurable improvements in their financial literacy, equipping them with essential life skills for navigating adulthood and future financial responsibilities.

Instrumentation

The researchers used a research-made questionnaire to measure the Grade 11 students' Financial Literacy Skills. The questions were contextualized relating to sinking fund and amortization schedule. To describe students' level of Financial Literacy, the researchers will use the percentage range below which was adapted from Yona and Loli (2021).

Table 1. Range of Percentage

Percentage of Rating Scale	Rating Quality
90 – 100%	Very Effective
72 – 89%	Effective
54 – 71%	Sufficiently Effective
36 – 53%	Less than Effective
18 – 35%	Not Effective
0 – 17%	Very not Effective

Statistical Treatment of Data

The following statistical tools were used to treat the gathered data in order to answer queries of the study:

Mean. This was used to measure the level of students' financial literacy skills. The mean percentage score also served as a basis for describing their overall achievement.

Paired t-test. This was applied to examine whether there was a significant difference between the students' pre-test and post-test scores.

Cohen's d. This was employed to determine the magnitude of the intervention's impact on students' financial literacy skills.

Data Analysis

Aside from the quantitative analysis, qualitative data were gathered through in-depth interviews to gain a richer understanding of the intervention's impact. The data were processed using a systematic approach that included initial coding, data reduction, and thematic analysis. First, all interview transcripts were read multiple times and subjected to open coding, in which recurring phrases, ideas, and expressions were assigned short descriptive labels. These initial codes were then grouped and refined, eliminating redundancies and merging similar concepts in the process of data reduction. This step helped in organizing a large amount of raw data into manageable categories. From there, patterns were identified and clustered into emergent themes that reflected students' perceptions and experiences with the 4Is and 4Ys intervention. Thematic analysis revealed insights on the perceived

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effectiveness of the intervention, the benefits students experienced, and the challenges they encountered during its implementation. This qualitative process offered deeper context to the quantitative findings and highlighted the nuanced impact of the intervention from the learners' perspective.

Procedure

The researchers utilized questionnaires administered before and after the implementation of the intervention. The pre-test questionnaire was designed to assess the students' financial literacy skills prior to the intervention, while the post-test questionnaire measured their skill levels after the implementation of the 4Is and 4Ys intervention.

Before commencing the study, the researchers formally prepared a request letter seeking permission to conduct the research. This letter was submitted to the school principal where the participants were enrolled. Upon receiving approval from the school administration, the researchers proceeded with the data collection process. Initially, a pre-test was administered to determine the baseline financial literacy skills of the Grade 11 students, particularly their ability to solve word problems related to real-life financial scenarios.

Following the pre-test, the 4Is and 4Ys intervention was introduced and conducted over 4 sessions. This intervention included structured activities and learning sessions focused on enhancing the students' understanding of key financial concepts. After the intervention period, a post-test using the same instrument was administered to evaluate any improvements in the students' financial literacy skills. The study had a total of 6 sessions including the pre-test and post-test.

All collected data from both the pre-test and post-test were carefully gathered, organized, and tabulated. This process allowed the researchers to compare results and determine the effectiveness of the intervention in addressing financial literacy gaps among the participants.

Table 2. Study Process

Session	Estimated Time duration	Title of the Session	What will happen?
Session 1	30 minutes to 1 hour	Introduction and Pre-test	Students will be informed of the things they will be doing for three days. They will be informed of the what, where, when why, and how of the seminar. After informing them, they will be given the Pre-test.
Session 2	1 hour	I do, You watch	In this session, students will be informed about the sinking fund and amortization schedule – its definition, difference, importance, and how to construct it using Microsoft Excel.
Session 3	1 hour	I do, You help	Continuously, after learning the two schedules and showing them how to construct it, they will be involved in constructing it.
Session 4	1 hour	You do, I help	In this session, students will construct their own sinking fund and amortization schedule with guidance.
Session 5	1 hour	You do, I watch	They will then be constructing sinking fund and amortization schedule on their own without guidance.
Session 6	30 minutes to 1 hour	Post-Test	Students will complete a post-test to measure the improvement in their knowledge and skills compared to the pre-test.

Ethical Considerations

Observing ethical standards in research is essential. At its core, it shapes the true aims of the study—pursuing knowledge, ensuring truth, and minimizing error—while also promoting values essential to collaborative work, such as trust, accountability, mutual respect, and fairness. In this study, ethical considerations were guided by well-established research ethics principles outlined in literature. According to Resnik (2020), ethical research involves respecting participants' rights, ensuring integrity, maintaining confidentiality, and promoting fairness throughout the research process. These values help protect human subjects while also supporting the credibility and reliability of research findings. Accordingly, this study adhered to key ethical principles, including respect for autonomy, beneficence, non-maleficence, justice, informed consent, confidentiality and data protection, integrity, and conflict of interest management.

RESULTS AND DISCUSSION

This chapter presents the findings gathered from the study. It includes data on students' level of financial literacy skills as measured in the pre-test, their performance in the post-test, and the statistical significance of the differences between the pre-test and post-test scores.

Research Objective No. 1: What is the level of grade 11 students' financial literacy skills before the 4Is and 4Ys intervention?

Presented in Table 2 is the level of grade 11 students' financial literacy skills before the intervention is reflected on their pre-test results, which financial literacy skills levels of the 20 grade 11 students in the group. The pre-test results revealed that the Grade 11 students had a low level of financial literacy prior to the intervention (M = 25.00, SD = 2.24), indicating a generally consistent yet less than effective skill set across the group.. The

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highest score achieved was 10 by one student, representing 5 percent of the group. Similarly, the lowest score was 1, also obtained by two students, accounting for 10 percent of the total. The most common score was 4, which recorded by 4, comprising 20 percent of the group respectively. The overall mean percentage score of 25% further emphasizes the students' financial literacy skills at the pretest stage.

Table 2. Mean Average of the Scores in Pre-test

Score	Frequency	Percentage
1	2	10%
2	2	10%
3	1	5%
4	4	20%
5	3	15%
6	2	10%
7	3	15%
8	1	5%
9	1	5%
10	1	5%
Total	**20**	**100%**
Mean		**10%**
Standard deviation		**2.24**
Mean Percentage Score		**25%**
Description		**Less than effective**

Prior to the intervention, the students demonstrated a limited understanding of financial literacy concepts, as shown by the overall mean score of 25%. This low percentage reflects a generally weak grasp of the topic across the group, indicating that most students struggled with key concepts such as sinking funds and amortization. The results highlight the need for structured and targeted instruction to improve their financial literacy skills.

This result is supported by the study of Artavanis and Karra (2021), which found that college students with low financial literacy, particularly in concepts like sinking funds and amortization, were significantly more likely to underestimate their future student loan payments, making them more vulnerable to financial shocks that could affect debt repayment and creditworthiness after graduation.
Similarly, Putra et al. (2021) reported generally low financial literacy among students, who are highly susceptible to making poor financial decisions, especially when engaging in loan programs. Even management students, despite having a stronger financial background, were not exempt from negative experiences, particularly with online loans, underscoring the widespread need for improved financial education.

Moreover, this aligns too with the findings of Liu and Zhang (2021), whose study confirmed that participants had low levels of financial literacy. Their research showed that higher financial stress among college students tends to trigger risky credit behaviors. Students with limited financial knowledge are more likely to hold misconceptions and poor value judgments regarding the rights and responsibilities associated with online credit services, making them more susceptible to credit misuse and other risky financial behaviors. Furthermore, low financial literacy was found to encourage impulsive spending and conspicuous consumption, further increasing the likelihood of engaging in harmful credit practices.

Research Objective No. 2: What is the level of grade 11 students' financial literacy skills after the 4Is and 4Ys intervention?
Presented in Table 3 is the post-test outcomes demonstrate the financial literacy skills of the 20 11th-grade students in the experimental group after the intervention was applied. The post-test results revealed that the Grade 11 students demonstrated a high level of financial literacy following the intervention (M = 90.75, SD = 1.56), indicating a consistently and very effective performance across the group. The highest score was 20, achieved by thirteen students, which accounts for 31.0 percent of the group. The lowest score, 15, was recorded by 1 student, representing 5 percent of the total. The scores that appeared most frequently were 18 and 20, attained by 12 students, making up 60 percent of the group. The mean percentage score of 90.75percent further supports the improvement in financial literacy skills, indicating a high level of performance following the intervention.

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Table 3. Mean Average of the Scores in Post-test

Score	Frequency	Percentage
15	1	5%
16	3	15%
17	2	10%
18	6	30%
19	2	10%
20	6	30%
Total	**20**	**100%**
Mean		**20%**
Standard deviation		**1.56**
Mean Percentage Score		**90.75%**
Description		**Very effective**

Following the 4Is and 4Ys intervention, which focused on guiding students in using Excel for sinking fund and amortization, the post-test results showed a significant improvement, with an average score of 90.75%, nearly four times higher than their pre-test performance. This indicates that the students developed strong financial literacy skills through the intervention.

These results are supported by Caporale and Avdoulas (2021), who found that who have high financial literacy is linked to certain traits, such as tracking expenses or having educated parents, and plays a key role in financial literacy of its respondents. As financial services become more accessible and complex, individuals lacking financial knowledge may face higher risks, such as over-indebtedness. Thus, improving financial literacy through targeted education is essential for empowering individuals to make informed and responsible financial decisions.

Moreover, this finding aligns with the study of Rapina et al. (2023), which showed that students, particularly accounting majors in West Java, Indonesia, demonstrated high financial literacy by effectively budgeting and managing expenses, leading to stronger entrepreneurial motivation. One of the highlighted factors is the exposure of the students in business setting.

Similarly, Böhm et al. (2023) found that financial literacy is strongly tied to students' overall education level. They emphasized that financial knowledge should be integrated across various subjects, not taught in isolation, to enhance financial understanding. This integrated approach, as seen in the Slovakian context, contributes significantly to improving students' financial literacy. Together, these studies highlight the importance of both targeted and holistic educational strategies in fostering responsible financial behavior.

Research Objective No. 3: Is there a statistically significant difference in the financial literacy skills of Grade 11 students before and after the implementation of the 4Is and 4Ys intervention?

Presented in Table 4, a comparison between pre-test and post-test scores was carried out to determine the intervention's effectiveness. A total of 20 students took part in the study, during which their financial literacy skills was measured before and after the introduction of the 4Is and 4Ys intervention. As illustrated in table are the results of the significant difference between the pretest and post-test scores, indicating the performance levels of 20 students in the experimental group computing sinking funds and amortization, $t(19) = 23.2$, $p < .001$. Since the probability value ($p < .001$) is less than the level of significance ($\alpha = 0.05$), the null hypothesis is rejected. The rejection is supported by having a standard deviation of 2.54, indicating the reliability of the mean. This means that there is a significant difference between the pretest and post-test scores.

In terms of the mean scores, the mean difference resulted 13.2, which indicated the improvement of scores, with the higher precision based on the standard difference of 0.568. The Cohen's d of 5.18 indicates an extremely large effect size, meaning the intervention had a very strong impact on improving students' financial literacy skills.

Table 4. Significant Difference Between the Pre-test and Post-test Scores

Type of Test	*N*	*df*	*Mean difference*	*sd*	*t-value*	*P-value*	*Effect size (Cohen's d)*	*Decision a=0.05*
Post-Test	20	19.0	13.2	2.54	23.2	<.001	5.18	Significant
Pre-Test	20							

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Based on the results, there was a significant improvement in students' financial literacy skills, with a 13.2% increase from pretest to post-test scores, indicating the effectiveness of the 4Is and 4Ys intervention using Excel in teaching sinking fund and amortization.

This is supported by the findings of Abad-Segura and González-Zamar (2020), who emphasized that integrating tools like Microsoft Excel in financial education enhances practical skills in planning, analysis, and decision-making. Financially literate individuals are not only proficient in managing money, credit, and debt but also understand long-term planning and ethical aspects of finance.

Similarly, Dewi and Ferdian (2021) found that seminar-style financial literacy training significantly improves financial knowledge and soft skills across diverse student groups. Programs that are context-driven, motivational, and aligned with learners' readiness, such as community-based models in Islamic finance education—further strengthen the case for adaptable and real-world financial literacy initiatives that support sustained behavioral change.

Lastly, this finding is also consistent with the study by Chandra et al. (2025), which showed that participants' scores improved significantly after receiving Ms. Excel training. Additionally, the questionnaire results revealed a high level of satisfaction, with an overall average rating of 4 out of 5. These outcomes suggest that the training effectively enhances participants' ability to manage finances using Excel. Therefore, similar to this study, Excel training proves to be a valuable tool in helping students better comprehend financial situations.

Research Question No. 4: Insights About 4Is and 4Ys Intervention that Students Share to the Academe

To answer this research question, in-depth interviews and focus group discussion were conducted with the informants and participants. Probing questions were asked to elicit their concept regarding the insights about 4Is and 4Ys intervention students shared to the academe. The major themes and supporting statements for research question number 1 were presented in Table 4. Participants had their responses to their own experiences and observation. From the answers of the participants, five major themes emerged: (1) realization of the practical value of financial concepts; (2) step-by-step learning deepens comprehension; (3) financial topics are learnable despite initial fear; (4) power of visualization in learning; (5) active learning builds confidence.

Table 7
Themes and Supporting Statements on the Insights that the Students Shared about the 4Is and 4Ys into the Academe.

Emerging Themes	Supporting Statements
Realization of the Practical Value of Financial Concepts	• "Yes ma'am, I enjoyed it and I'm very proud of myself because I finally learned how to use Excel, haha. At first, I thought this topic was too difficult, but now I clearly understand how to manage loans and savings. Now, I'm more motivated to learn because I really see its use in real life." – *IDI-01* • "I felt happy and enjoyed it because I honestly didn't expect that I could understand difficult concepts like amortization. At first, it seemed complicated, but through the activities and Excel demonstrations, I realized that this is really important in life, especially in managing money." – *IDI-03* • "I'm glad I learned this topic because it's not just for school—it's something I can use in real life. I understand now that it's important to know about interest and payments because this knowledge is useful for financial planning, loans, and more." – *IDI-07* • "I'm happy and proud of myself because now I understand the basic concepts of budgeting and money planning, like amortization and sinking funds. At first, it seemed hard and technical, but now I know that it can really help in real life—especially when I start working and managing my own income." – *IDI-10*
Step-by-Step Learning Deepens Comprehension	• "But when we started going through it slowly using Excel, it felt like a puzzle I was gradually solving. The step-by-step approach, ma'am, really helped a lot." – *IDI-01* • "But when the lesson was broken down into parts, it became clearer. It was like slowly eating food—you can't swallow it all at once, haha." – *IDI-03* • "Yes ma'am, the step-by-step teaching really helped me understand the topic of sinking fund and amortization. I liked that the lesson wasn't rushed because I could adjust to the pacing." – *IDI-05* • "But when we started using Excel, it became easier for me to understand the flow of the calculations and how the formulas are connected. The step-by-step teaching method using Excel really guided us in understanding the lesson clearly and correctly." – *IDI-08*

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Financial Topics Are Learnable Despite Initial Fear	• "Before, I was very intimidated by Excel—it seemed like it was only for experts—but now, my fear of it has lessened a bit." – *IDI-01* • "At first, I was really scared because it was all new. But because of the practice and your guidance, sir and ma'am, I managed to catch up." – *IDI-04* • "At first, it seemed complicated, but through the activities and Excel demonstrations, I realized that this is really important in life, especially in managing money." – *IDI-06* • "At first, I thought this was way too hard for me. But after lots of practice, I realized it's doable if you're patient and focused on understanding the process." – *IDI-10*
Power of Visualization in Learning	• "But because the teaching was gradual, I understood it better. Using Excel was a bit overwhelming at first, but eventually, I got used to it. Now I can clearly see the flow of the computations and how to track monthly payments." – *IDI-01* • "But when we began using Excel, I saw how the values changed month by month, especially when paying off a loan in installments. The visual presentation of the changes helped me understand the process better." – *IDI-06* • "When we used Excel, I saw how the fund grows monthly and how different factors like interest rate affect it. I visually saw the progression, which made understanding easier." – *IDI-09* • "At first, it was hard to understand on paper, but with Excel, I could see the movement of payments each month—how much went to interest and how much to the principal. It was much clearer and more visual for me." – *IDI-10*
Active Learning Builds Confidence	• "I liked that style because I could see the steps first before doing it on my own. I feel more comfortable when guided at the start." – *IDI-02* • "The 'You do–I help' approach was the most effective for me because it gave me confidence to do the task on my own." – *IDI-07* • "Even though I was working independently, I knew the teacher's support was still there if I needed help. This built my confidence and made me more engaged in learning the lesson." – *IDI-08* • "I really felt that I was in control of my learning process, not just relying on the teacher. Because of that, I became more active and confident that I understood the lesson." – *IDI-10*

In this study, it was found that the intervention helped students realize the practical value of financial concepts. Students expressed those lessons on amortization and sinking funds were no longer abstract but useful in managing their personal finances, such as budgeting and understanding loans. This aligns with findings from Liu and Lin (2021), who showed that internet-based financial education significantly enhanced university students' financial awareness and behavior by contextualizing abstract concepts into daily money-management skills. Their integrated 18-week course helped learners internalize practical financial literacy, reinforcing the real-world relevance of classroom instruction. Likewise, Anderson (2023) emphasized that financial literacy empowers individuals to make informed financial decisions, contributing to long-term financial well-being. When students see the relevance of lessons to their real lives, their motivation to learn increases, as demonstrated in this study.

Furthermore, students shared that a step-by-step learning approach deepened their comprehension of complex financial topics. Participants revealed that when lessons were broken down into smaller, manageable parts, it became easier for them to follow and understand, especially when using Excel. This echoes the benefits of structured learning methods highlighted by Pettersson and Wettergren (2020), who emphasized that emotion-aware, sequential instruction improves learners' grasp of challenging mathematical content by mitigating cognitive load. Breaking down tasks ensures students build mastery gradually, which aligns with the scaffolding strategy used in this intervention. Additionally, Adler (2019) stressed that guiding students through text or problem-solving in stages significantly improves understanding and helps prevent cognitive overload. This method ensured that learners had time to reflect and gradually build mastery over difficult content.

Another insight that emerged from the data was that students realized financial topics are learnable despite initial fear. At the start, many expressed anxiety over technical terms and the use of Excel, but later acknowledged that with enough practice and teacher guidance, the subject became understandable. This supports the findings of Salas-Velasco (2022), whose randomized controlled trial with final-year undergraduates demonstrated that a short online financial education course significantly improved both objective financial knowledge and perceived financial self-efficacy—showing that even those initially unfamiliar with financial terms and tools can grasp them effectively with proper instruction. Similarly, Hasler et al. (2023) found that individuals with higher financial literacy reported lower levels of financial stress and greater resilience, highlighting the role of education in reducing anxiety toward

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financial matters. Thus, the intervention helped change students' mindsets from "this is too hard" to "I can do this."

The data also revealed that students appreciated the power of visualization in learning, particularly through Excel. They mentioned how seeing values change in real time and observing how computations affected outcomes helped them better understand abstract concepts. This finding aligns with Nugraha et al. (2023), who, in their study on improving financial literacy for millennials using online teaching materials, demonstrated that interactive, visually driven content significantly enhanced understanding of financial concepts—highlighting the educational value of visualization and dynamic tool. Similarly, the study of Sieng (2024) demonstrated that using GeoGebra, a dynamic geometry software, significantly improved students' visual representation and conceptual understanding in geometry, highlighting the effectiveness of interactive visualization tools in mathematics education. Visualization not only clarifies difficult ideas but also aids retention, making learning more meaningful. When students can "see" what's happening, the process of understanding becomes less abstract and more concrete.

Lastly, the study showed that students gained confidence through active learning, especially when applying the "You do—I help" strategy. Participants said they felt more in control and responsible for their learning, which led to increased engagement and self-assurance. This supports Deslauriers et al. (2019), who noted that students in active learning environments perform better and are more engaged than those in passive settings. Additionally, O'Flaherty and Costabile (2020) emphasized that active learning improves students' self-confidence and decision-making skills. When students are given a safe space to explore and make mistakes while learning, it fosters deeper understanding and a stronger sense of capability.

CONCLUSION

The pre-test results revealed that Grade 11 students had a low level of financial literacy skills before the 4Is and 4Ys intervention. With an overall mean percentage score of only 25% and a consistent standard deviation of 2.24, it was evident that students struggled particularly with concepts such as sinking funds and amortization. These results reflect the need for targeted intervention, as students demonstrated insufficient foundational knowledge, making them vulnerable to financial misunderstandings and poor decision-making in real-life situations.

Following the implementation of the 4Is and 4Ys intervention, the students showed remarkable improvement in their financial literacy skills. The post-test yielded a mean percentage score of 90.75%, which indicates a highly effective outcome. This improvement suggests that the intervention significantly enhanced their understanding of financial concepts, especially in applying Excel in solving problems related to loans and savings. The intervention succeeded in bridging the gaps identified during the pre-test.

The statistical analysis confirms that the 4Is and 4Ys intervention had a significant impact on improving financial literacy. A t-value of 23.2 with a p-value of <.001 shows that the improvement from pre-test to post-test is statistically significant. The large effect size of 5.18 (Cohen's d) indicates that the intervention had an extremely strong influence on students' learning. These results justify the effectiveness of the intervention as a strategic teaching tool in enhancing students' computational and conceptual understanding of finance.

Students also shared meaningful insights about the intervention through focus group discussions and interviews. They highlighted the value of real-life application, the effectiveness of step-by-step learning, and how visualization through Excel enhanced their comprehension. Many overcame their initial fear of financial topics and technology and gained confidence through active, guided learning. These insights demonstrate that the intervention was not only effective academically but also impactful in shaping students' attitudes and motivation toward learning finance.

In summary, the 4Is and 4Ys intervention successfully addressed the low financial literacy skills among Grade 11 students by significantly improving their knowledge, engagement, and confidence. The consistent growth observed from pre- to post-test, along with students' positive experiences and reflections, validates the intervention as both a practical and empowering educational strategy. This action research underscores the potential of integrating technology and active learning to effectively teach real-world financial skills in senior high school.

RECOMMENDATION

Considering the low pre-test performance, it is recommended that schools conduct an initial assessment of financial literacy skills before introducing financial topics in class. This helps identify specific areas where students struggle the most, such as sinking funds and amortization. Teachers should also consider reviewing foundational financial concepts early in the semester to better prepare students for more complex topics. This proactive approach ensures that gaps in knowledge are addressed before they hinder further learning.

Given the significant improvement after the intervention, it is recommended that the 4Is and 4Ys strategy be adopted as a standard instructional tool in teaching financial literacy. The use of Excel, coupled with structured lesson plans, enabled students to grasp complex ideas effectively. Teachers should integrate this model in their regular instruction, ensuring that students receive practical and hands-on experience in managing financial data. The success of this intervention suggests that such tools can be scaled and adapted for other math-related financial topics as well.

The significant results obtained in the t-test highlight the effectiveness of structured interventions in mathematics and finance education. Therefore, educators and school administrators should consider allocating time and resources for designing and implementing similar interventions. Professional development training on the 4Is and 4Ys approach

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should be conducted to equip more teachers with the skills to facilitate impactful financial literacy lessons. Encouraging collaborative teaching practices may also help sustain the success of such interventions.

Based on student feedback, it is recommended to maintain and enhance the interactive and step-by-step features of the intervention. Teachers should continue to emphasize visualization, real-life applications, and a supportive learning environment. These methods not only improve understanding but also boost students' confidence and interest in the subject. Incorporating more student reflections and discussions about financial decision-making could further enrich their learning experience.

Overall, the 4Is and 4Ys intervention proved to be a transformative approach in addressing financial literacy gaps among senior high school students. To maximize its benefits, it should be institutionalized and supported by school policy. Further studies may be conducted to test its effectiveness in other contexts and grade levels. By doing so, the academe can foster a generation of financially literate students who are better prepared for real-world responsibilities and challenges.

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