

Money Savvy: Development of an Instructional Module Integrating Financial Literacy in Teaching and Learning Business Mathematics

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Abstract. Financial literacy encompasses the awareness, knowledge, skills, attitude, and behavior necessary for making informed financial decisions and achieving financial well-being. This study utilized the ADDIE model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. Data were gathered from learners, licensed financial advisors, and experts using validated and reliable instruments such as questionnaires, evaluation checklists, journals, and written interviews. Analysis methods included mean, standard deviation, rank, and thematic analysis. The findings revealed that learners exhibited a moderate level of financial literacy. Licensed financial advisors identified five specific Business Mathematics lessons where financial literacy could be effectively integrated. The resulting instructional module was evaluated based on its learning objectives, content, organization, presentation, format, design, activities, assessments, and integration of financial literacy. Experts rated the module as "Highly Acceptable," while learners found it "Acceptable." The module was praised for its uniqueness, interest, clarity, effectiveness, flexibility, and ability to enhance the understanding and application of mathematical concepts while promoting financial literacy. Consequently, it is deemed suitable for integrating financial literacy into Business Mathematics lessons. Further research is recommended to evaluate the module's impact on academic achievement and to develop similar instructional materials for other relevant subjects.

Keywords: Financial literacy; Business Mathematics; Instructional module; Educational design, ADDIE model.

1.0 Introduction

Financial literacy is crucial for making informed financial decisions and contributing to personal and national financial stability (OECD, 2020). It is essential within educational frameworks like Ambisyon Natin 2040 and the Sustainable Development Goals (SDGs) (DepEd Order No. 022, 2021).

The Organization for Economic Cooperation and Development (OECD) Programme for International Student Assessment (PISA), which was conducted in 2020, revealed findings regarding low levels of financial literacy among 15-year-olds across 20 countries and economies (OECD, 2020). The assessment, which included 117,000 learners, indicated that approximately one in four students could not make basic decisions related to everyday spending, highlighting a pervasive issue in financial literacy education (OECD, 2020). The study emphasizes the critical need for comprehensive interventions and improved financial education programs to equip young individuals with essential money management skills and address the challenges of low financial literacy levels (OECD, 2020).

The COVID-19 pandemic has highlighted the need for financial literacy, especially with adopting digital financial services (Saini & Rosli, 2021). However, challenges persist, such as investment fraud and low financial literacy among Filipinos. A Bangko Sentral ng Pilipinas survey revealed that only 41% of Filipino adults could correctly answer 1 of 3 financial literacy questions, highlighting the need for comprehensive interventions (Bernardo & Fernando-Resurreccion, 2018). In response, there is a growing recognition of the necessity to integrate financial literacy into educational curricula, particularly in mathematics education. (Said et al., 2022).

Integrating financial elements into mathematics education is crucial for enhancing students' financial literacy (Saini, 2021). This can be achieved through various methods, including inquiry-based mathematics, technological simulations, interactive modules, simulation games, workshops, and school camps (Saini, 2021). However, there is a significant gap in the availability of specialized modules for teaching financial education to secondary school mathematics teachers. These educators require specific training modules to equip them with the necessary skills to implement effective teaching strategies (Said et al., 2022). Conducting a study to develop and implement these specialized training modules is urgent to ensure that teachers can deliver quality financial education, ultimately fostering a financially literate generation.

In line with this, the urgency of conducting a study to develop and implement instructional modules integrating financial literacy into teaching and learning mathematics is paramount. This study explores the importance of incorporating financial literacy into the mathematics curriculum, shedding light on its implications for learners, educators, and society. The module is named "Money Savvy" because a financially savvy person is well-versed in dealing with expenditures, credit, and other money matters. This instructional module will teach the learners about budgeting, saving and investing, spending, borrowing, and protecting money.

2.0 Methodology

2.1 Research Design

The study utilized the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model to develop and evaluate an instructional module integrating financial literacy into business mathematics.

2.2 Research Participants

Licensed Financial Advisors. Ten licensed financial advisors, each with at least one year of experience, participated in the document analysis of the Business Mathematics Curriculum Guide. Their diverse backgrounds included certified public accountants, mathematics teachers, and businessmen engaged in part-time financial advising. Their collective expertise was crucial for identifying specific lessons in the business mathematics curriculum where financial literacy could be integrated.

Learners. The study involved 35 Grade 11 ABM (Accountancy, Business, and Management) students from Sapien National High School in assessing their financial literacy levels. Additionally, ten Grade 11 STEM learners participated in the financial literacy questionnaire's pilot testing. The same 35 Grade 11 ABM learners were also the respondents for implementing and evaluating the instructional module.

Experts. Five purposefully chosen experts evaluated the acceptability of the developed instructional module. Their expertise spanned licensed financial advising, curriculum development, instructional material development, English, and teaching business mathematics in senior high school.

2.3 Research Instrument

Document Analysis Questionnaire. Identified integration opportunities for financial literacy.

Financial Literacy Survey Questionnaire. Adapted from the OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion 2022 to assess learners' financial literacy levels.

Evaluation Questionnaire for Acceptability. Adapted from the evaluation tool of Nabayra (2019) for learners and experts.

Written Interview Questionnaire. Assessed learners' experiences with the instructional module.

2.4 Data Gathering Procedure

Analysis. The Document Analysis Questionnaire was administered to ten licensed financial advisors to identify lessons suitable for integrating financial literacy. The Financial Literacy Survey Questionnaire was administered to Grade 11 ABM students to assess their financial literacy levels. Statistical tools, including frequency counts, rank, mean, and standard deviation, were used to analyze the responses.

Design. Based on data from the analysis stage and the business mathematics course syllabus, an outline and format for the instructional module were created. The format was modeled after DepEd Enclosure 1: Elements and Technical Specifications of the LR Module from Regional Memo No. 91 S. 2020, with modifications aligned to the study's objective.

Development. The instructional module was developed using Microsoft Word and Microsoft Publisher, incorporating feedback from four experts in business mathematics, financial advising, module writing, and language. Answer keys were written in reverse layout to prevent cheating.

Implementation. The instructional module was tested with 35 Grade 11 ABM learners for five weeks. The teacher of Grade 11 ABM and the researcher facilitated the tryout, with additional observations from the head teacher of the Mathematics Department. Based on feedback, answer keys were provided only to the teacher to prevent cheating.

Evaluation. Learners and experts used the evaluation questionnaire to evaluate the acceptability of the instructional module. Learners' experiences were also assessed through journals and written interview questionnaires.

2.5 Ethical Considerations

The study adhered to ethical guidelines based on the American Psychological Association's (APA) 7th Generation standards. Participants' privacy and confidentiality were maintained, and they were assured of no harm from participation. In addition, the study included measures to ensure that students' regular school activities were not affected by the module's implementation. Directly impacted by this module was the students' performance, which was monitored and assessed every week through formative assessments. This continuous monitoring and assessment were essential to ensuring that students' performance was not harmed and that any necessary adjustments could be made promptly to optimize learning outcomes while maintaining the integrity of the regular school curriculum.

3.0 Results and Discussion

3.1 Learners' Level of Financial Literacy

Table 1. Summary of the overall learners' level of financial literacy

Category	SD	Mean	Interpretation
Basic Financial Concepts	0.60	3.86	High
Income and Budgeting	0.70	3.54	High
Banking and Saving	0.50	2.36	Low
Credit and Debt	0.80	3.01	Moderate
Investing	0.60	2.78	Moderate
Long-Term Planning	0.50	3.25	Moderate
Over-all Rating	0.54	3.13	Moderate

Table 1 summarises the overall learners' level of financial literacy. The study results indicated that ABM learners have a moderate level of financial literacy, with a mean score of 3.13 and SD of 0.54. They excel in basic financial concepts and income management but have limitations in banking, saving, investing, and long-term planning. This trend is consistent with previous research indicating global gaps in practical financial skills among young adults and high school learners (Mitchell & Lusardi, 2011; Mandell & Klein, 2009; Erner et al., 2016).

3.2 Lessons in Business Mathematics that Financial Literacy can be Integrated.

Table 2 shows the top five (5) specific lessons in business mathematics for integrating financial literacy. These lessons include 'Understanding Mark-on, Mark-down, and Mark-up,' 'Defining salary, wage, income, and benefits,' 'Problem-Solving with Interests and Commissions,' 'Applying Fractions, Decimals, and Percentages in Real-Life Scenarios,' and 'Problem-Solving with Proportions.' This was supported by the study of Sagita et al. (2023), who said that the relationship between mathematical and financial literacy is a key focus in education, with the potential for financial understanding to be constructed through mathematics education.

Table 2. Top 5 specific lessons in Business Mathematics for integrating financial literacy

Lessons	SD	Mean	Rank
1. Understanding Mark-on, Mark-down, and Mark-up	0.63	4.8	1.5
2. Defining salary, wage, income, and benefits	0.42	4.8	1.5
3. Problem Solving with Interests and Commissions	0.67	4.7	3
4. Applying Fractions, Decimals, and Percentages in Real-Life Scenarios	1.26	4.4	4
5. Problem-Solving with Proportions	1.49	4.3	5

3.3 Development of an Instructional Module in Business Mathematics Integrating Financial Literacy

The instructional module's development was guided by the outcomes of the Analysis Stage, which involved evaluating the financial literacy levels of Grade 11 ABM learners and conducting a thorough document analysis of the Business Mathematics Curriculum Guide by Licensed Financial Advisors. The results indicated a moderate level of financial literacy among the learners. The identified top five specific lessons where key financial literacy concepts could be effectively integrated included Understanding Mark-On, Mark-Down, and Mark-Up; Defining Salary, Wage, Income, and Benefits; Problem-Solving with Interests and Commission; Applying Fractions, Decimals, and Percentages in Real-Life Scenarios; and Problem-Solving with Proportions. After identifying the top five specific lessons in business mathematics suitable for integrating key financial literacy concepts, the researcher, with the assistance of other experts, identified the key concepts of financial literacy to be integrated into each lesson.

Learners' and Experts' Acceptability Evaluation of the Instructional Module

Table 3. Overall acceptability of the instructional module

	Learners			Experts			SD	Mean	Description
	M	SD	D	M	SD	D			
Learning Objectives	4.60	0.17	HA	4.76	0.09	HA	0.11	4.68	Highly Acceptable
Content	4.43	0.19	A	4.80	0.00	HA	0.26	4.62	Highly Acceptable
Organization & Presentation	4.30	0.11	A	4.72	0.11	HA	0.29	4.51	Highly Acceptable
Format & Design	4.27	0.20	A	4.80	0.00	HA	0.37	4.54	Highly Acceptable
Learning Activities	4.30	0.12	A	4.72	0.11	HA	0.30	4.51	Highly Acceptable
Assessment	4.35	0.11	A	4.76	0.09	HA	0.29	4.55	Highly Acceptable
Financial Literacy Integration	4.29	0.18	A	4.80	0.00	HA	0.36	4.55	Highly Acceptable
Overall Rating	4.36	0.12	A	4.77	0.04	HA	0.06	4.56	Highly Acceptable

Table 3 summarizes the overall acceptability of the instructional module. The instructional module has been rated "highly acceptable" ($M = 4.55$, $SD = 0.06$), indicating that it has met all standards and requires no revision. Based on the results, the participants agreed that the instructional module is highly acceptable in terms of learning objectives, content, organization and presentation, format and design, learning activities, assessment, financial literacy integration, and overall rating. This aligns with Lumabit's (2018) findings that instructional modules can enhance learners' critical thinking and mathematics performance.

Learners' Experiences in Using the Instructional Module

Upon questioning the learners about their experiences with the developed instructional module in delivering lessons, their responses highlighted several key points. They found the instructional module to be unique and interesting, easy to understand, effective and flexible, enhance understanding and application of mathematical concepts, and promote financial literacy.

4.0 Conclusion

The study contributes significantly to the field of education by addressing critical gaps in financial literacy education and emphasizing targeted interventions to bridge these gaps among learners. Integrating financial concepts into core subjects, such as business mathematics, is crucial in enhancing students' mathematical skills and equipping them with essential financial decision-making abilities, thereby promoting their overall financial well-being. The research highlights the linkages between business mathematics and financial literacy, underscoring the foundational role of mathematical proficiency in navigating real-world financial scenarios. This insight is pivotal in shaping educational approaches that prepare students for practical challenges beyond academic settings, aligning theoretical knowledge with practical application, and fostering a deeper understanding of financial concepts.

Moreover, the development of user-friendly instructional modules, exemplified by the "Money Savvy" module discussed in the study, represents a significant advancement in providing accessible and engaging financial education. These modules offer structured platforms for learners to explore financial topics independently, regardless of geographical or socioeconomic constraints, thus promoting inclusivity in financial literacy education. Future studies could explore the long-term impact of integrated financial literacy education on students' financial behaviors and decision-making skills through longitudinal research. Expanding research to encompass diverse demographics and educational settings would provide a comprehensive understanding of module effectiveness across different contexts. Exploring technological integration for enhanced accessibility and engagement, developing teacher training programs focused on financial literacy, and aligning curricula with current educational goals and standards in financial literacy education are also promising avenues for future investigation. By addressing these areas, researchers can build upon the foundation laid by this study, further advancing financial literacy education and empowering learners to make informed financial decisions in an increasingly complex financial landscape.

5.0 Contributions of Authors

The author is the sole contributor to this study.

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7.0 Conflict of Interests

The author declares that upon the completion of this paper, there was no conflicting party or interest

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