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The mediating role of financial literacy and the moderating role of financial technology in the relationship between financial education and students' financial behavior

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Abstract

This study examines the mediating role of financial literacy and the moderating role of financial technology in the relationship between financial education and students' financial behavior. Despite financial education being one of the most positively accepted factors that can influence responsible financial behavior, the explanation of these relationships has causally remained obscure. The present study aimed to provide a more clear understanding of this influence pathway in the context of unprecedented digital innovation speed. This study employs a cross-sectional design to evaluate the impact of financial education on the financial behavior of accounting students in Medan (382 students). Using PLS-SEM analysis, the results indicate that financial literacy fully mediates the relationship between financial education and financial behavior. While financial education did not have a significant direct impact on financial behavior (β=0.016; p=0.807), its influence was strongly channeled through financial literacy (β = 0.796; p = 0.000). Financial technology was found to negatively moderate the path from financial education to financial behavior (β = -0.131; p = 0.035), but it did not significantly moderate the relationship between financial literacy and behavior (p = 0.148). These findings highlight the necessity of adaptive curricula in the digital finance era. Furthermore, the theoretical implications of this research enrich our understanding of financial behavior formation models, challenge long-held assumptions about the direct influence of financial education, and emphasize financial literacy as an important prerequisite.

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Keywords: Financial behavioral, Financial education, Financial literacy, Financial technology.

1. Introduction

The rapid proliferation of financial technology (FT) has fundamentally reshaped the financial ecosystem, presenting a unique paradox for accounting students: while they possess formal financial training, the complexity of digital financial services often outpaces the practical application of their education in shaping sustainable financial behavior. Despite their academic background, these students remain vulnerable to the

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double-edged sword of FT, which can either facilitate financial inclusion or exacerbate impulsive financial decisions. This paradox is increasingly evident in emerging economies like Indonesia. Specifically, for accounting students in Medan, there is a noticeable discrepancy between their high exposure to financial curricula and their actual day-to-day financial decision-making. Despite their academic background, many students remain susceptible to the allure of digital consumption facilitated by FT, which often leads to impulsive spending rather than strategic financial planning.

Consequently, it is very important to have strong financial literacy (FL) among students [1], [2], [3], [4]. Accounting students are future financial professionals and financial managers. In this case, financial education (FE) and financial theory are advocated in accounting programs [3], [5]. FE improves individual understanding of financial product and services, financial concepts, risks, and financial well-being in totality [2]. FE and FT can come together for better FL for students [5], [6]. Learning by experience, such as through financial simulations and the use of financial applications of technology, can be practical for financial applications [7], [8].

Some literature indicates that education of financial, together with financial literacy and appropriate financial behavior (FB), are positively correlated [9], [10], [11], [12], especially for students in accounting programs. FE can be considered the link between theory and practice and can be helpful for students in building healthy FB. FT has dramatically changed the financial services industry because of the range of digital tools and platforms created [5], thus offering both new opportunities and risks. In this case, in-depth knowledge of FT is also vital for students of accounting [13]. Thus, the literature on the role of FE in improving FL and enhancing FB of accounting students in relation to their understanding of financial technological use is relevant.

This study analyzes the relationship between FE and FB by involving FL as a mediator and FT as a moderator, to assess the impact of FE on the FL and FB of accounting students in the FT era. This study is urgently needed, as the new emerging financial world is very complex and accounting students form the driving force of it. The new financial era is described as the FT era, with an immense increase in financial innovation and the availability of financial services to the society [14], [15], [16], [17]. In this situation, there is an increasing demand for society to be financially literate. Accounting students, as future financial professionals, are expected to have an excellent command of financial and investment knowledge. The lack of such knowledge can affect their future careers and the provision of necessary financial guidance to other members of the society. The FT era, therefore, offers new frontiers and challenges in financial management. On the one hand, FT innovations make it possible for the users to access financial services more conveniently and easily [5], [6], [13]. At the same time, FT innovations may increase the convenience of people to commit fraud and make illegal investments and transactions. For the youth to exploit the opportunities and deal with the FT risks, it is essential for the youth to have the requisite knowledge and skills.

This study is, therefore, expected to provide practical help for education institutions in the planning of FE curricula that are more relevant and adaptable to the development of FT. Understanding the forces that impact the FL and behavior of accounting students helps the education institutions to design financial curricula that are more relevant and more adaptable to the needs of the students. Policymakers can also use the results of the research to help in formulating policies that will enhance support for improving FL of the youth. This study, therefore, is relevant to both the academic world and society. Therefore, strengthening financial literacy through adaptive financial education is essential to help accounting students not only understand financial concepts in theory, but also apply them responsibly in real-life financial decisions, especially in the rapidly evolving FT era where digital financial services create both opportunities and risks.

2. Literature review

This research combines the theory of planned behavior and social learning theory to explain the process of building FB mechanisms among students through education and literacy. According to the theory of planned behavior by Icek Ajzen, individual behavior is determined by intention, which is determined by three factors,

namely attitude toward the behavior, subjective norms, and perceived behavioral control [18], [19], [20]. In these studies, the FB of students is a kind of behavioral control they exhibit. FE is an exogenous intervention that directly affects attitudes and behavioral control. Structured education provides students the confidence that they are able to manage finances well, resulting in increased intention to behave frugally and invest significantly [21], [22]. Social learning theory emphasizes that people learn by observing and processing information in a social context [23], [24], [25]. FB is an educational process that converts financial information into a cognitive understanding of students called FL. This theory explains the mediating role of literacy, as education does not directly change behaviors but has to go through a cognitive process [22], [26], [27]. FL serves as a link between the theoretical knowledge gained through education and the cognitive ability to make complex financial decisions. Thus, the effectiveness of FE in increasing students' literacy depends on the development of their responsible FB.

2.1. Financial behavior, financial education and financial literacy

FB is an interdisciplinary field, which borrows the principles of economics and psychology to describe individual financial choices. In contrast to traditional economic theory, which is hinged on the assumption that economic agents always behave rationally, behavioral finance studies have established that very often, individuals exhibit some psychological and emotional effects which can cause them to make “irrational” financial decisions [28]. Simply put, behavioral finance is the study of how psychological influences and factors such as emotions; cognitive biases; and heuristics affect financial decision-making of individuals as well as financial markets. This field covers a range of areas such as investment decisions, debt management, savings, and retirement planning.

FL is a common factor in FB studies and this can be defined as an individual’s knowledge and skills in understanding and managing financial information. FL is often associated with investment decisions [28], [29], [30]. Studies have established that individuals with adequate FL are likely to make more informed and rational financial decisions than those with low or no FL [29], [31]. Apart from FL, FB studies have also linked risk tolerance to FB of individuals and other economic agents. Risk tolerance is an economic term that is used to describe the level of risk an individual or economic agent is willing to accept when making financial decisions. It is usually an important factor to be considered when making investment decisions, but even when people have all the relevant information, they can still behave in an irrational manner in the face of fear of loss in the future [28]. Risk aversion, which has been examined in several studies, refers to the fear of losing gains from investments or taking financial risks in the future and this can cause an individual to not only make irrational decisions, but also to underinvest.

Cognitive and emotional biases are another school of thought in FB that puts much emphasis on the role of psychological biases and influences on FB. These biases often cause a deviation from rationality. FB can also be a function of several demographic characteristics such as age, gender, education, and experience. This is as shown by [11], [30], [31], [32]. The application of the theory of behavioral finance focuses on an explanation for anomalies in financial decisions that are not taken into account by classical economic theory. Considering psychological and cognitive aspects, FB enriches enriches our understanding of the motivations and challenges that individuals face in managing their finances.

FE is the base upon which FL is built [17], [33]. FL itself refers to the knowledge and ability a person has in giving meaning to financial concepts so that proper decisions can be made in financial situations [33], [34], [35]. In the case of accounting students, FL is important because they will be professionals responsible for handling finances, both personal and organizational. A few factors explain how FE has impacted the FL of accounting students: first, the enhanced knowledge of finance. FE provides students with basic knowledge about some key financial concepts, such as investment, risk management, financial planning, and taxation [36], [37], [38]. Unless there is adequate FE, accounting students are likely to be confused about what occurs when complex financial decisions are made. Second: development of skills in analysis. FE teaches students how to analyze financial information, identify a problem in the process, and seek an appropriate solution to the problem [5], [38], [39]. This is a very critical skill among accounting students since they will find themselves in situations where they will be forced to make decisions based on financial information.

Third: changes in attitude toward money. FE can change the way students view money and prioritize finances. They became more aware of the importance of saving, investing, and managing debt wisely [37], [40]. Fourth: increased self-confidence. FE enhances the self-confidence of students in handling their finances. According to [38], [40], once students are perceived as financially capable, they are more likely to take necessary actions

toward their goals. Fifth: it develops an understanding of service and financial products. FE helps students understand various service and financial products, such as loans; credit cards; and investments. According to [38], this understanding enables to them to choose the products and services that best suit their needs and avoid fraud or harmful financial practices. Finally: curriculum relevance. Some courses in the accounting curriculum, such as financial accounting, financial management, and capital markets and investments, are actually relevant to the concept of FL [41], [42].

It's important to remember that FE is not a guarantee of FL. It is crucial to distinguish between FE and FL. FE refers to the process of knowledge transfer through formal instruction or training, whereas FL is the outcome of that process, encompassing the understanding, skills, and confidence an individual possesses to make informed financial decisions. Other factors that can be taken as possible explanations for individual FL include personal experience, social influence, accessibility of financial resources, and many others identified in [43]. From the survey, it can be seen that the current level of FL of students in higher education institutions, including those pursuing an accounting course, remains unsatisfactory. Based on this, every possible effort needs to be made to improve the quality of FE obtained by accounting students in higher educational institutions. It can be achieved by implementing FL in the current curriculum and applying engaging and contextual teaching methods in accounting subjects, besides giving students exposure to apply their knowledge of FL in practical life situations as identified in [3].

FE has an important influence on the FB of accounting students. FB is about how people handle, use, and make choices about their money [4], [34], [41]. The scope of the concept is extensive and can involve aspects of saving habits, debt management, investment, and financial planning for the future [34], [41]. The following points should be noted regarding the impact of FE on the FB of accounting students. 1) Increase in knowledge and awareness: FE provides a higher level of knowledge to the students about the interest rate, inflation, investment risks, and retirement planning. As a result, they have a better understanding of the implications of each financial decision they make. 2) Change in attitude: In addition to higher knowledge, FE also helps to change the students' attitude toward money and finance. Students develop a higher sense of awareness of the need to save and invest wisely and take care of debt management. 3) Development of skills: FE also provides practical skills to tackle day-to-day finance, including budgeting, expense tracking, and the proper use of financial tools. 4) Increase in self-efficacy: FE may boost the confidence level of students in their ability to manage funds successfully. It is the most expected that when people have high self-efficacy, they may take positive and responsible steps to manage their money. 5) Social norms: FE may introduce students to positive social norms related to financial management. They learn from others' experiences, share information, and support one another to achieve respective financial goals [10], [43].

It must be remembered that the effects of FE on FB are not automatic and that other factors such as personality, social environments, and access to resources can influence FB of students. In addition, the delivery of programs can also influence the effectiveness of FE. Some programs may be more effective in changing students' behavior if they are interactive and need based. In students pursuing courses in accounting, FE is highly relevant since these students are future financial professionals who are expected to have substantial responsibility in managing financial affairs of companies and giving financial advice to clients. Therefore, in-depth knowledge of FE and its effect on FB is highly pertinent to prepare them for the role of competent financial professionals.

H1: FE influences FB
H2: FE influences FL
H3: FL influences FB
H4: FL mediates the relationship between FE and FB

2.2 Financial technology as a moderating variable

In this context, "moderation" means that the influence of FE on FL and FB can be strengthened or weakened by the presence and characteristics of FT. FT is a term which describes new technologies in the financial sector that offer a variety of service and products, such as digital payments, online loans, automated investments, and more [5], [44], [45]. FT provides easier and wider access to various financial products and services [5]. This technology can make the impact of FE stronger as students are given more opportunities to practice the financial knowledge and skills. For example, they can open an investment account through an online platform or use an app to track their spending. However, if students have limited financial knowledge, the easy accessibility of FT can have a detrimental effect. Students may be more likely to take unnecessary risks or get into unmanageable debt.

FT products and services are often more complex than traditional financial products [46]. These characteristics make it challenging for students to understand their options and how to evaluate them. Students can better understand this complex world of FT products and services if they have a sound FE that provides them with a framework for analyzing them. However, if FE is not relevant or up-to-date, students may feel overwhelmed and make poor financial decisions. FT platforms can also be an excellent way to access financial information and financial education [13]. There are many websites and apps that are related to financial planning tools, education, and resources. However, students need to be discerning when choosing reputable sources of information and avoiding misleading ads. Students can develop critical thinking skills and the ability to distinguish between objective and biased information through FE.

Social media is also an integral part of students' financial thinking and behavior [43]. They are often influenced by what their peers say and do. FT amplifies this influence by providing a space for students to share their experiences and advice on financial products and services. Students can learn more about themselves and how to make their own financial decisions through FE. FT also enables personalization by tailoring financial products and services to individuals' unique needs and preferences [13]. This can make FE more relevant and valuable. However, personalization can also make students feel more in control and more capable of managing their money than they actually are. In conclusion, FT can have both positive and negative effects on accounting students' FE, FL, and FB. The effects of FT on these variables are complex and multifaceted. To be effective, FE needs to consider the unique characteristics of FT and provide students with the skills and knowledge necessary to manage their money effectively in the digital era [42].

H5: FT moderates the relationship between FE and FB
H6: FT moderates the relationship between FL and FB

3. Research method

The current study used quantitative methodology with an explanatory design to test the hypotheses and the causal model. The employed technique is PLS-SEM (partial least squares-structural equation modeling) analysis, as it is suitable for complex mediation and moderation models with several variables. The respondents are accounting students in Medan. The research selected a sample of 382 accounting students from several universities in Medan city. This is an appropriate sample selection as accounting students are expected to have an adequate academic foundation of financial concepts that is the subject of this research. This study was performed according to the ethical research standards for studies with human participants. Participation in the survey is completely voluntary, and participants have been informed of the purpose of the research prior to giving their consent. All data were collected and processed under strict confidentiality to protect the privacy of the subjects. Full anonymity was preserved in the process of analysis and reporting the results. No personally identifiable information is collected or retained. The sampling method was purposive sampling. It is a type of non-probability sampling that chooses units based on their own judgment or the study's purpose. The sample criteria include the accounting students who are actively involved in financial transactions or have a basic understanding of financial markets. The scientific justification of purposive sampling in this research is to ensure that respondents have experience or knowledge related to the research topic, which is FE and behavior, to strengthen the internal validity of the variable relationships in this study. However, the limitation of using purposive sampling is that it limits the extent to which the research results can be generalized to the broader population of accounting students or to non-accounting students. An online distributed questionnaire was used to gather data. The questionnaire employed a 5-point Likert scale to measure the FE variable (6 items), FL (9 items), FT (7 items), and FB (6 items). The instrument's validity and reliability were first tested through confirmatory factor analysis in PLS-SEM before the structural model analysis. These steps ensured that the collected data were appropriate for testing the proposed research model.

4. Results

The first stage of the analysis is to ensure the psychometric quality of the measurement instrument. The validity and reliability measurement results in Table 1 show that all constructs used in this study have passed stringent validity and reliability requirements. To determine whether convergent validity is established, outer loadings, average variance extracted, and composite reliability can be utilized. The outer loadings are all greater than

0.70, which implies that the items are excellent measures of their intended constructs. The AVE values for all constructs are greater than 0.50, and the composite reliability values are greater than 0.70, demonstrating good convergent validity. To assess discriminant validity, the Fornell-Larcker criterion, and the heterotrait-monotrait ratio were examined. The Fornell-Larcker criterion results show that the square root of the AVE for each construct is higher than the correlation between constructs, and all heterotrait-monotrait ratio values are below 0.90. This implies that the constructs have strong discriminant validity. The composite reliability and Cronbach's alpha values for all constructs are above the threshold of 0.70, which shows that the items within each scale are highly consistent with each other. Thus, the research instruments used in this study are considered valid and reliable for measuring the constructs.

Table 1. Validity and reliability test results

Variable	Items	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
FB	6	0.743 – 0.811	0.881	0.909	0.625
FE	6	0.830 – 0.867	0.920	0.938	0.715
FL	9	0.723 – 0.832	0.918	0.932	0.604
FT	7	0.737 – 0.853	0.906	0.908	0.641

Source: author's own work

Table 2. Fornell-Larcker test results

Variable	FB	FE	FL	FT
FB	**0.778**			
FE	0.719	**0.843**		
FL	0.703	0.743	**0.757**	
FT	0.708	0.765	0.706	**0.797**

Source: author's own work

The results of Fornell-Larcker testing, as presented in Table 2, illustrate that the square root of the AVE for each construct is higher than its correlations with other constructs in the model. For example, the FE construct has an AVE value of 0.843, which is greater than its correlation with FB of 0.719 and FL of 0.743. This shows that each latent variable has a stronger correlation with its own indicators compared to other latent variables, thus it can be concluded that the model meets the criteria for good discriminant validity.

To ensure that each variable in this study measures a unique concept and does not empirically overlap, a discriminant validity test using the heterotrait-monotrait (HTMT) ratio method with a strict threshold of 0.90 was conducted. As presented in Table 3, the results of the analysis show that all HTMT values are within the range of 0.531 to 0.871. Although the highest score was recorded in the relationship between FL and FB at 0.871, the value remains below the specified maximum limit. These findings clearly prove that there is no overlapping meaning between constructs, so each variable in this model is stated to have strong discriminant validity and is ready for further analysis at the structural model stage.

Table 3. Heterotrait-monotrait test results

Variable	FB	FE	FL	FT
FB	-			
FE	0.794	-		
FL	0.871	0.803	-	
FT	0.797	0.839	0.776	-

Source: author's own work

Table 4. SRMR test results

Fit indicator	Saturated model	Estimated model	Criteria
SRMR	0.072	0.073	< 0.08 (good fit)
NFI	0.919	0.919	> 0.90 (good fit)

Source: author's own work

To ensure that the theoretical model examined in this study aligns well with the empirical data, we conducted a model quality evaluation using model fit indicators, including the Standardized Root Mean Square Residual (SRMR) and Normed Fit Index (NFI). Based on the analysis results, an SRMR value of 0.072 was obtained for the saturated model and 0.073 for the estimated model (Table 5). Since both values are below the critical threshold of 0.08, the research model has a low level of residual error and is categorized as having a good fit. Support for the model's quality is also evident from the NFI value, which reaches 0.919 in both the saturated and estimated models. This value exceeds the minimum required criterion of > 0.90, indicating that the constructed model performs well in explaining the research data compared to the baseline model. Since these two criteria were fulfilled, it can be concluded that this structural model is statistically valid and has high credibility for use in the next hypothesis testing stage.

Table 5. VIF test results

Variable relationship	VIF Value	Description
FE → FB	3.304	there is no multicollinearity
FE → FL	2.712	there is no multicollinearity
FL → FB	2.489	there is no multicollinearity
FT → FB	2.915	there is no multicollinearity
FT → FL	2.642	there is no multicollinearity
FT x FE → FB	1.939	there is no multicollinearity

Source: author's own work

Before conducting hypothesis testing, we evaluated potential multicollinearity in the structural model to ensure the stability of the path coefficient estimates. This test was conducted by analyzing the variance inflation factor (VIF), with values above 5.0 generally indicating redundancy among independent variables that could bias the research results. Empirical findings show that all constructs in this model have VIF values that range from 1.939 to 3.304, as presented in Table 5. Considering that none of the values exceed the critical threshold, it is concluded that this structural model is completely free from multicollinearity issues. Thus, the stability of the model has been achieved, allowing the hypothesis testing to proceed with a high level of reliability according to strict methodological standards.

4.1. Structural model evaluation

In this section, a structural model evaluation using the coefficient of determination test (R-square), effect size test (*f*-square), and predictive relevance test (Q-square) was conducted.

Table 6. R-square test results

Variable	R-square	R-square adjusted
FB	0.695	0.692
FL	0.598	0.595

Source: author's own work

The test results indicated that the R-square value of the financial behavior variable was 0.695. This illustrates that the interaction model of FE, FL, and FT can explain 69.5% of the variation in the financial management behavior of accounting students. Factors outside the model influenced the remaining 30.5%. This value is considered to have a high level of predictive accuracy and a high level of explanatory power. This indicates that, although technology acts as an inhibitor, the model in this study is very effective in capturing the dynamics of students' financial decision-making in the digital era. The R-square value obtained for the FL variable is 0.598. The antecedent variables influenced students' FL by 59.8%. This result indicates the importance of the

academic curriculum and FT implementation in Medan in shaping students' FL. The remaining unexplained 40.2% suggests that practical experience and social interactions, which are not fully captured by formal education variables, also play a role in FL.

Table 7. Effect size (*f*-square) test results

Structural variable relationship	FB	FL	Effect size
FE	0.035	0.218	0.035= small; 0.218= medium
FL	0.382	-	large
FT	0.056	0.104	0.056= small; 0.104= small
FT x FE	0.006	0.000	no effect

Source: author's own work

Table 7 shows the results of effect size (f-square) evaluation, which is useful for measuring the magnitude of the relative contribution of each exogenous variable in predicting the endogenous variable. The f-square value of 0.02 is classified as small, 0.15 as moderate/medium, and 0.35 as large based on Cohen's criteria [47]. The results of the analysis indicated that FL has the most dominant contribution to FB with the value of f-square of 0.382, which is categorized as large effect. This indicates that FL is the most important predictor, which is highly significant in determining the FB of the students. At the same time, FE has a moderate effect on predicting FL, with an f-square value of 0.218. However, the direct effect of FE on FB is relatively small (f-square = 0.035). The FT variable also yielded similar results, with small contributions to FL (f-square = 0.104) and FB (f-square = 0.056). On the other hand, the interaction between FT and FE on the endogenous variable shows a very low value of f-square (0.006 and 0.000), indicating that the interaction effect does not contribute significantly to this structural model in practice. The overall data supports the argument that FL is the most significant determining factor related to the improvement of FB quality compared to other variables in the model.

Table 8. Predictive relevance (Q-square) test results

Item	Q-square predict	Description
FL1	0.221	Good predictive relevance ($Q^2 > 0$)
FL2	0.312	Good predictive relevance ($Q^2 > 0$)
FL3	0.318	Good predictive relevance ($Q^2 > 0$)
FL4	0.390	Good predictive relevance ($Q^2 > 0$)
FL5	0.392	Good predictive relevance ($Q^2 > 0$)
FL6	0.391	Good predictive relevance ($Q^2 > 0$)
FL7	0.265	Good predictive relevance ($Q^2 > 0$)
FL8	0.506	Good predictive relevance ($Q^2 > 0$)
FL9	0.225	Good predictive relevance ($Q^2 > 0$)
FB1	0.274	Good predictive relevance ($Q^2 > 0$)
FB2	0.301	Good predictive relevance ($Q^2 > 0$)
FB3	0.240	Good predictive relevance ($Q^2 > 0$)
FB4	0.360	Good predictive relevance ($Q^2 > 0$)
FB5	0.353	Good predictive relevance ($Q^2 > 0$)
FB6	0.509	Good predictive relevance ($Q^2 > 0$)

Source: author's own work

The results of the predictive relevance (Q-square) test are presented in Table 8, which is used to evaluate the predictive power of the structural model of the study. A Q-square value greater than 0 (Q-square > 0) for PLS-SEM analysis indicates excellent predictive relevance of the model for the endogenous variable and its

indicators. The test results illustrate that all indicators of the FL variable (FL1 to FL9) have positive Q-square values ranging from 0.221 to 0.506. The highest value is observed for FL8 with 0.506. This shows that the model has a satisfactory ability to predict the observational data for each of these FL indicators. Likewise, for the preceding variable, all the FB indicators (FB1 to FB6) also have Q-squared values greater than zero, ranging from 0.240 to 0.509. The value of the FB6 indicator shows very high predictive accuracy. Overall, these test results indicate that the model has adequate predictive relevance. The results of this study are in accordance with the previous R-square result for FB of 0.695, meaning that the interaction model between FE, FL, and FT has a high level of predictive accuracy and explanatory power in explaining students' FB. The results met all the criteria for all indicators, and this structural model is valid to explain the dynamics of student financial decision-making in the digital era.

4.2. Hypotheses testing and direct effects

After evaluating the structural model (inner model) through the assessment of the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2), the next step is to perform hypothesis testing to answer the research questions. This test is carried out to determine the strength of the relationships among variables by examining the path coefficient values and the level of significance through the p-values resulting from the bootstrapping process. This section explains how each exogenous variable predicts the endogenous variable in the model. The significance criterion used in this study is a p-value smaller than 0.05, which indicates that the relationship between variables has a significant effect. The following are the results of the direct effect test summarized in the figure and table below. This test was used to see how strong the relationship between variables is by looking at the path coefficient value and the level of significance through the p-value generated from the bootstrapping process. This section will also explain the predictive relationships between each exogenous variable and the endogenous variable in the model. The significance criterion used in this research is a p-value of less than 0.05, which indicates that the relationship between variables has a significant effect. The results of the direct effect test are summarized in Figure 1 and Table 9 below.

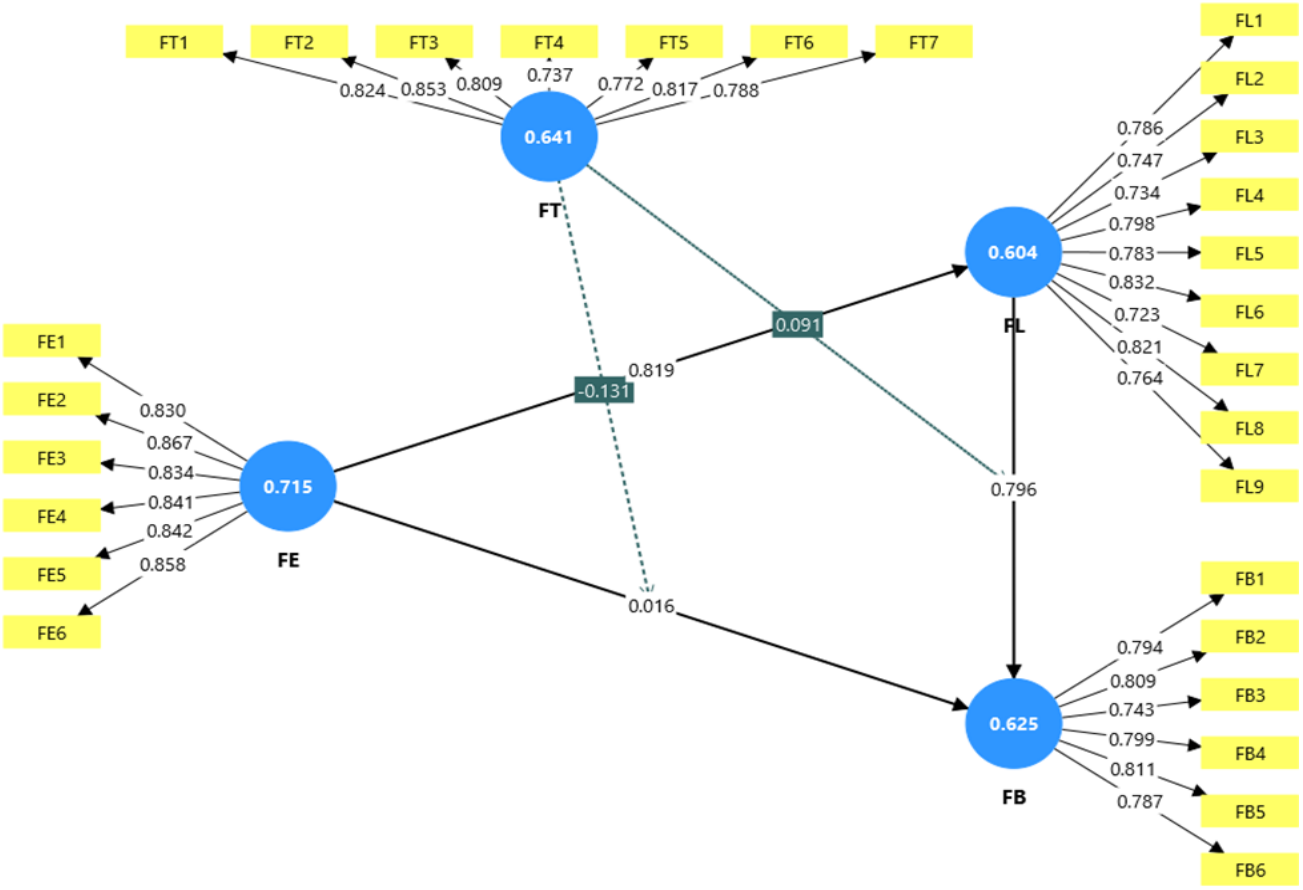

Figure 1. Conceptual framework

Table 9. Hypotheses testing results

Variable	Path coefficient	Sample mean	Standard deviation	T-statistics	p-values
FE → FB	0.016	0.011	0.066	0.244	0.807
FE → FL	0.819	0.820	0.020	41.353	0.000
FL → FB	0.796	0.797	0.045	17.569	0.000
FT → FB	0.146	0.153	0.051	2.858	0.004
FT x FE → FB	-0.131	-0.138	0.062	2.106	0.035
FT x FL → FB	0.091	0.097	0.063	1.446	0.148

Source: author's own work

The structural model is claimed to have excellent predictive relevance through the Q-square test and powerful explanatory power with a 0.695 R-square value. The next step is to assess the relationships among variables. The test is performed to assess the predictive capability of exogenous variables for the endogenous variables using path coefficient analysis and significance levels. Table 10 displays the results of the direct effect test. The results of the analysis show that FE has no significant direct effect on FB ($\beta = 0.016$; $t = 0.244$; $p = 0.807$). This means that educational interventions may not be sufficient to directly change students' FB. However, FE shows a positive and highly significant relationship with FL ($\beta = 0.819$; $t = 41.569$; $p = 0.000$), which is the strongest relationship in this structural model. Additionally, FL was found to have a positive and significant effect on FB ($\beta = 0.796$; $t = 17.569$; $p = 0.000$). These results confirm that strong financial knowledge is a significant predictor of responsible FB. The FT variable also has a significant direct effect on FB ($\beta = 0.146$; $t = 2.858$; $p = 0.004$), indicating that access to FT facilitates students' daily financial activities.

Table 10. Mediation Analysis and VAF Table

Variable relationship	Indirect effect*	Direct effect	Total effect* (indirect + direct)	VAF (%) (Ie* : Te*)	Description
FE → FL → FB	0.652	0.016	0.668	97.60%	Full mediation

Source: author's own work

The mediation test through the FL variable was conducted to uncover the in-depth mechanism of how FE predicts students' FB. The path analysis showed that the indirect effect was 0.652, which was much greater than the direct effect of 0.016. This mediation was strong, as shown by the variance accounted for (VAF) calculation, which was 97.6%. With reference to the methodological criteria suggested by [48] a VAF value above the threshold of 80% implies complete mediation. These results are a major theoretical contribution to the literature of behavioral finance. The results of the full mediation analysis suggest that FE does not have a direct effect that will necessarily change the student's behavior. Instead, the effect is fully dependent on the ability of education to first increase the individual's capacity for FL. This is supported by previous findings that the direct path from FE to FB is not significant ($p = 0.807$), confirming that without a real increase in literacy, exposure to FE will only be passive information without any impact on actual financial actions. FL is a critical cognitive bridge for students of the digital age. FE provides the theoretical underpinning, and FL trains students to critically evaluate risks and opportunities. Therefore, the success of FE programs should not be measured by the amount of material offered but by their capacity to improve literacy and understanding, which is the path that has been statistically proven to encourage healthy and responsible FB.

This study further investigates the moderating effect of FT on the association between FE and FB. The interaction test results reveal a significant negative coefficient of -0.131 ($t = 2.106$; $p = 0.035$), which suggests a dampening effect. A simple slope analysis was performed to elucidate the dynamics of the interaction. As depicted in Figure 2, education and behavior are positively associated at lower levels of FT use (−1 SD, red line). However, at high levels of FT usage (+1 SD, green line), the slope of the line indicates a negative trend. This phenomenon suggests that the effect of traditional FE on improving students' behavior may decline among students who are highly dependent on FT.

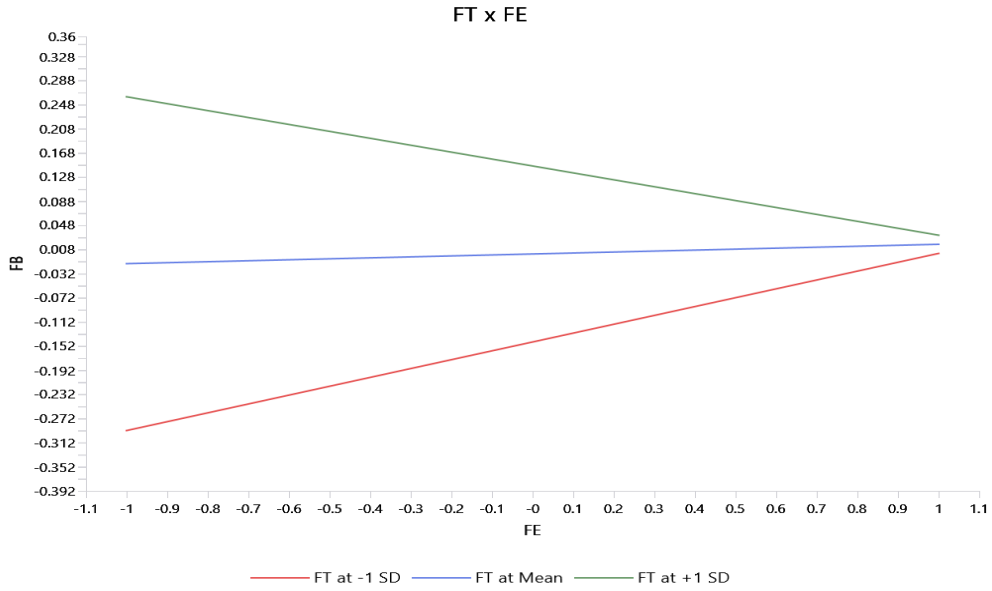

Figure 2. Simple slope graph

This decline probably happens because of the convenience of digital transactions that can induce impulsiveness and, hence, override the financial principles that have been acquired. The interaction between FT and FL did not show a significant influence ($p = 0.148$), which means the role of technology does not change the influence of literacy on students' FB in this model, contrary to the second hypothesis. The results of this negative moderating effect have important implications for understanding the dynamics of digital finance among students.

The research findings reveal that FT is not always a positive reinforcement for traditional FE. Technology use can lead to high dependency, resulting in a phenomenon where the positive impact of formal FE is diminished by the ease of access and speed of digital transactions. This pattern illustrates how a digital interface design with a focus on ease and speed of transactions can create an environment that promotes more reactive than reflective financial decision-making, which diminishes the opportunity to apply financial principles learned through formal education. The differences in outcomes between FE and FL moderation give important insights into the distinction between financial knowledge and a deeper understanding of finances. The absence of a moderating effect of FT on the relationship between FL and FB demonstrates that a holistic understanding of finance provides resilience against the adverse effects of technology dependency. This means that FL, a solid conceptual understanding, can be a foundation that continues to be relevant even when people are in a very simple and rapid digital transaction environment.

Thus, deep FL is an evaluative framework that enables students to maintain healthy FB regardless of their dependence on FT. The practical implications of these findings are of high relevance to policymakers and educational institutions. An effective FE program in the digital era must acknowledge that just increasing financial knowledge is not sufficient to address the challenges presented by the digital financial ecosystem. The financial literacy program should explicitly incorporate elements that equip students with strategies to resist the temptation of digital transactions and remain financially disciplined in a landscape that encourages instant consumption. Additionally, these results highlight the importance of an educational approach that not only imparts knowledge but also fosters a deep conceptual understanding that is resilient and adaptable to ongoing technological change.

5. Discussion

5.1. The literacy paradox: why education is not enough

The findings of this research reveal a fundamental anomaly in the higher education ecosystem regarding exposure to a formal financial curriculum, which does not automatically shape responsible FB when it comes to students. The empirical data presented shows that FE does not have a significant direct influence on the FB

of accounting students in Medan (β = 0.016, p-value = 0.807). Our findings corroborate the "literacy paradox," in which the theoretical knowledge acquired in college frequently becomes a passive cognitive resource that does not influence accounting students' practical decision-making in their daily lives.

The insignificance of this direct relationship aligns with widespread criticism in global literature. For example, the fundamental meta-analysis conducted by [49] shows that FE interventions often explain only about 0.1% of the variance in actual financial behavior. This indicates that the effects of FE tend to be small and may quickly fade if not practiced consistently. This phenomenon may explain why an accounting student might be able to prepare complex financial statements in class, yet still struggle with personal financial management, meaning that the knowledge remains theoretical memorization without behavioral internalization [50]. The empirical evidence presented by [49], [50] reinforces our findings by demonstrating a mastery gap, where accounting students have a high conceptual understanding but fail in the practical application of expense management.

It is argued that the key to breaking this paradox lies in full mediation through FL. This means that FE will only be effective if it is successfully converted into a deep functional understanding of a transformation process, as indicated by the forceful coefficient value of our model (β = 0.796, p-value = 0.000). This mediation path acts as a cognitive bridge that transforms theory into tangible action. The result of our research align with the study conducted by [51] in the context of students in Indonesia and the study conducted by [52], which found that FE will not have a significant impact without being driven by an increase in functional literacy. Thus, FL is not merely additional knowledge but an absolute catalyst that determines whether FE will lead to action or just end up as a pile of passive theory. For educational institutions, this is a call to shift the teaching paradigm. The focus should no longer be solely on passing competency exams, but on ensuring that all FE materials strengthen financial literacy and actively guide accounting students toward sustainable financial well-being.

5.2 FT as a moderating variable: a new perspective

Currently, the FB of accounting students is influenced by both disciplined formal education and the aggressive penetration of digital technology. The most paradoxical yet significant finding of our study is that FT acts as a negative moderator, which significantly reduces the positive effect of FE on the actual behavior of accounting students (β = -0.131, p-value = 0.035). Much of the literature says that FT is an instrument of inclusion, but our research results indicate that technology is a hindrance to accounting students in Medan and deteriorates the effectiveness of their curriculum knowledge. Cognitively, the ease of accessing digital transactions seems to create a shortcut that sparks instant gratification. This phenomenon illustrates how the easy use of platforms, such as pay-later services or e-wallets, can trigger impulsive consumption that disregards the principles of caution taught during college [53], [54].

This finding is consistent with the statement of [55], [56] that the widespread adoption of FT can actually weaken the link between FL and FB, especially among the younger age groups who tend to have higher confidence but minimal practical experience in mitigating digital risks. The R-squared value of 0.695 indicates the explanatory strength of this model, as the variables in this research explain 69.5% of the variance in students' FB, indicating strong predictive power for behavioral studies. The results of this study also provide a serious warning that the integration of technology without adequate digital literacy training can increase financial vulnerability even among individuals with an accounting education [57]. [58] shows that cognitive biases induced by transaction features that are too easy to use often lead to negative financial outcomes due to excessive FT use. This unlimited accessibility seems to be a double-edged sword for students in Medan: on one side, it offers efficiency, but on the other, it becomes a trap of consumerism that negates the financial discipline which should be the main outcome of their education. It is for this reason why a curriculum transformation in higher education institutions has become a necessity. The challenge for the future is not merely the transfer of conventional financial management theories, but the development of critical literacy that can withstand technological disruption. Education should teach students how to navigate digital risks, not just technical accounting, so that technological progress can promote financial well-being rather than hinder responsible financial behavior.

6. Conclusion

This research revealed the complex dynamics behind the FB of accounting students, with the main finding confirming the existence of a literacy paradox in the digital era. Empirically, the results show that FE does not have a significant direct influence on financial behavior, as evidenced by a β coefficient of 0.016 and a p-value of 0.807. This phenomenon indicates that merely completing the formal curriculum in college does not guarantee the development of wise financial behavior. The effectiveness of education depends on its ability to be translated into functional FL, which acts as a full mediator in this model, as evidenced by a β coefficient of 0.796 and a p-value of 0.000. The most contradictory yet crucial finding is the role of FT as a negative moderator or inhibitor, with a β coefficient of -0.131 and a p-value of 0.035. The presence of FT was found to weaken the positive impact of education on the FB of accounting students in Medan. The ease of access and instant gratification offered by digital platforms tend to create cognitive shortcuts that erode financial discipline and trigger impulsive behavior, even among individuals with an accounting education background. Overall, this research model has high predictive power with a value of 0.695, which means that 69.5% of the variance in students' FB can be explained by the interaction between education, literacy, and technology. As a practical implication, higher education institutions should consider significant curriculum improvement to better integrate FL and digital technology into the learning process. FE should no longer be merely a transfer of theoretical knowledge but should also incorporate character-building and digital-literacy-based protection against technological risks. Future learning strategies should prepare students with the skills to navigate risks in the FT ecosystem so that technological advances become a driver of financial well-being rather than a trap of consumerism for young professionals.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contribution

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Ethical approval statement

Our institution does not require research ethics approval for reporting individual cases or case series.

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