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Effects of E-Module Implementation on Financial Literacy and Financial Behaviour among Secondary School Students

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Abstract— *This study examined the effects of implementing a financial e-module on the financial literacy and financial behaviour of Economics students in selected secondary schools in Sandakan, Sabah. Specifically, the study assessed differences in financial literacy by gender and explored the relationship between financial literacy and financial behaviour. A quasi-experimental design with a non-equivalent control group was employed, involving 97 students (49 in the experimental group and 48 in the control group). The experimental group was exposed to the financial e-module, while the control group received conventional instruction. Pre- and post-test questionnaires were administered to measure financial literacy and financial behaviour. Data were analysed using ANCOVA, MANCOVA, and Pearson correlation. The results showed that the e-module significantly improved students' financial literacy and financial behaviour compared to conventional teaching. Female students demonstrated significantly higher levels of financial literacy than their male counterparts. Furthermore, a significant positive relationship was found between financial literacy and financial behaviour. Overall, the financial e-module proved to be an effective intervention for enhancing financial awareness and promoting responsible financial practices among secondary school students.*

Keywords— *Financial Literacy, Financial Behaviour, and E-modul Implementation.*

I. Introduction

Financial literacy is increasingly recognised as a practical life skill that every individual needs in order to navigate today's challenging economic environment. When people lack the necessary financial knowledge and skills, they may find themselves making decisions that appear convenient at the moment, but could later lead to financial strain. These difficulties not only affect their personal financial stability but can also contribute to wider economic issues in society. For many young people, this challenge becomes more apparent as they move from relying on family support to managing their own money. This transition period often happens before they have enough exposure or confidence to handle real financial responsibilities (Butterbaugh et al., 2020; Siegfried & Wuttke, 2021). Previous studies have also highlighted that lower levels of financial literacy among youth are commonly associated with weaker saving habits, difficulties in managing money at school or home, and even lower academic motivation and well-being (Liu & Zhang, 2021). When analysing on the international scale, the OECD (2019) has found that around 15-year-old students are unable to even meet the minimum standards of financial literacy, and among ten, the high level of competency is attained by only one. In Malaysia, the National Financial Literacy Strategy 2019-2023 reported about the same issues and discovered that every one out of three adults does not feel confident about their financial literacy (Financial Education Network [FEN], 2019). Surveys also indicate that Malaysian students are having problems transferring financial knowledge to real-life experiences and this casts doubt on the efficiency of the current financial education programs in schools.

Schools are crucial in determining the financial literacy and behaviour of the students. Research has also established that students who are better informed financially are at a greater likelihood of practicing responsibly, including saving, budgeting, and spending wisely (Khoo et al., 2022). Nevertheless, the findings of the past are still not consistent. Although there are studies that indicate that financial literacy should have a strong positive correlation with financial behaviour, others indicate weak or even mixed findings (Muhammad and Norlita, 2021). This discrepancy indicates that there should be better approaches and strategies to instruction that are beyond the classroom.

One of the possible solutions is the use of technology in financial education. Education Blueprint 20132025 in Malaysia notes the importance of using ICT in improving the quality of learning. Most of the available innovations include e-modes, which are flexible, highly structured, and interactive material that can be accessed anywhere, anytime (Yaniawati et al., 2021; Kusumadyahdewi and Firdiansyah, 2022). According to the previous research, it is possible that financial e- modules can improve knowledge and financial practices, especially among the youth (Ashade et al., 2021). Their application in secondary schools is however, not well researched.

The issue has another aspect to do with gender differences. There are different studies indicating that males students have higher score in financial knowledge and lower score in behaviour and there are studies indicating that female students have higher score in both behaviour and financial knowledge (Kadoya & Khan, 2020; Tseng and Kou, 2019; Zulkeflly and Rosdi, 2022). Such contradictory findings underscore the need to examine the differences in genders in certain circumstances.

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To this, this paper explores the impacts of the introduction of a financial e-module to financial literacy and financial behaviour of high school Economics students. It also examines the difference based on gender and how it connects literature and behavior. Through the use of a quasi-experimental design, the research provides empirical information concerning the ability of e-modules to enhance financial literacy and responsible financial behaviors among young students.

II. Literature Review & hypothesis

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is a renowned concept that has been used extensively as a strong theory to predict or account various human behaviours in various sectors, such as health, education, and finance among others. TPB dictates that behaviour is majorly informed by behavioural intention, which is influenced by three key constructs through which it is attitude towards the behaviour, subjective norms and perceived behavioural control. When applied to financial education, attitude will deal with the scores that students attribute to the necessity to spend money wisely, subjective norms will involve the social pressure of students on their peers, parents, or teachers, and perceived behavioural control will be concerned with the self-confidence of students in their opportunities in practicing financial skills. There is a significant amount of evidence that TPB has proved to be effective in terms of financial decision-making: purchasing, saving, and investment behaviour among young adults and adolescents (Amagir et al., 2020; Kaiser et al., 2022). Therefore, the study of the impact of financial literacy on the real behaviour of students is well equipped with TPB.

Financial Literacy and Student Development

The idea of financial literacy is generally understood as knowledge and skills to make sound financial choices and to invest financial resources intelligently (OECD, 2019). It involves the knowledge on saving, budgeting, credit and investment. Financial literacy has been noted to be important among students in training them to cope with future financial instabilities. According to several studies, the more financially literate people are, the more favorable their financial behavior, including regular savings, fewer debts, and the judicious use of money can be considered (Khoo et al., 2022). Nonetheless, the literature has some contradictory findings. As an illustration, Muhammad and Norlita (2021) found that more and more literate people were not necessarily financially better-behaved, which points to knowledge potentially being ineffective without the reinforcement of behaviour. This disparity is one of the reasons why interventions must be implemented in a way that does not only relay financial knowledge, but also develops the behavioural ability to put that knowledge into practice in everyday living activities.

Financial Education Interventions

Educational programs aimed at enhancing financial literacy have been introduced globally and they include classroom education, workshops, campaigns and online education. The effect of structured programs on the knowledge, attitudes, and behaviour has been found to be influential on the students. Batty et al. (2015) showed that financial education prior to university enhanced the knowledge and attitude. Becchetti et al. (2013) discovered that high school randomized financial education intervention was favorable in influencing investment. A national school experiment in the article by Luhrmann, et al. (2015) presented the evidence that students who receive financial education can better their performance. Literacy modules of B40 youth were emphasized in Malaysia as a successful implementation (Ashade et al., 2021). These studies demonstrate that interventions are capable of enhancing financial capability which are inconsistent and limited at secondary school level, so another quasi-experimental study is required.

Financial Literacy

Financial literacy has been widely investigated across different populations. Many studies have revealed that, with specific financial education, there is a great deal of knowledge students gain on their savings, budgeting and credit. According to Lusardi and Mitchell (2014), literacy interventions will help people have the necessary skills to make sound financial choices, whereas Lührmann et al. (2015) found that structured education can bring great improvement to the financial knowledge of students. According to the Asian context, literature has also reported positive effects of literacy training on young decision-making and financial awareness. However, contradictions are also present in the literature: there are those programs that enhanced knowledge, but did not determine the transfer to long-term retention and confidence (Zhu, 2019). In Malaysia, little research has been done, especially at secondary schools, although national policy focuses more on financial literacy (Ministry of Education Malaysia, 2019). These results imply that the efficacy of literacy-based interventions should be determined and empirically tested among the students at school.

H1: There is no significant effect of the intervention compared to conventional teaching methods on students' financial literacy.

Financial Behaviour

Financial behaviour encompasses students' actions in managing money, including saving, spending, borrowing, and investing. Most previous research tends to believe that more financial literate people are more responsible in their practices, yet the evidence is not consistent. Lusardi and Mitchell (2014) emphasised that financial knowledge is correlated with better financial decision, whereas Shim et al. (2010) proved that financial literacy is associated with saving and budgeting behaviour in young adults. Other studies, on the other hand, have pointed out that knowledge is not as much as behaviour since it is still evident that certain students practice poor financial behaviour yet they have sufficient literacy (Muhammad & Norlita, 2021). There is also a dearth of research studies on the effects of structured financial education on real behaviour in the school level in the Malaysian context. The results of this study highlight the significance of determining whether financial behaviour changes over a period of time can be achieved through the implementation of financial education interventions.

H2: There is no significant effect of the intervention

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compared to conventional teaching methods on students' financial behaviour.

Gender Differences in Financial Literacy

The role of gender in financial literacy has been extensively studied, yet findings remain inconsistent. Tseng and Kou (2019) discovered that the female students performed better than the male students, proving the greater rates of financial literacy and more beneficial financial conduct. On the other hand, Zulkeflly and Rosdi (2022) gave significantly higher scores to male students when it comes to financial knowledge tests, which indicate that males have more contact with the financial aspect of decision-making. Other articles reported slight or no differences in the research of the genders which means that the outcome may be dependent on the situational factors including the culture and the socioeconomic background. Such discrepancies underscore the importance of further studies to be made to help explain the fact whether the gender differences are still present when the students are taken through organized financial education programs.

H3: There is no significant difference in financial literacy levels between male and female students after the intervention.

Relationship between Financial Literacy and Financial Behaviour

Financial literacy and financial behaviour have been a major focus of studies on financial education. It has been established that more literate people have more favorable financial habits, including decreasing saving amounts, spending responsibly, and not taking out too much debt (Khoo et al., 2022; Lusardi and Mitchell, 2014). This fact substantiates the hypothesis that the knowledge has a direct effect on the financial decision-making. Nevertheless, other studies have different results. Muhammad and Norlita (2021) also found that increased financial literacy did not directly convert to responsible behaviour with some students spending more despite having shown proper literacy. In the same manner, Zhu (2019) also noted that although there was an improvement in literacy following interventions, behaviour was not affected in the long-term. These contradictions bring rather significant questions of the power of the literacy and behaviour relation, particularly within the school-based interventions. Therefore, the issue of whether financial learning gains any significance to the financial behaviour of students should be tested.

H4: There is no significant relationship between overall financial literacy and financial behaviour after the intervention.

Financial Literacy as a Predictor of Financial Behaviour

In addition to examining correlations, several studies have investigated whether financial literacy serves as a predictor of financial behaviour. Analyses using regressions help in getting an idea of how much knowledge can help explain behavioural outcomes. Lusardi and Mitchell (2014) discovered that financial literacy had a good predictability of saving and retirement planning decisions. Similarly, Amagir et al. (2020) demonstrated that literacy was a good predictor of student budgeting and investment behaviour. Instead, other studies indicate that although knowledge appears relevant, it can be less important than contextual and psychological variables, which are peer effects and self-control which tend to predict a larger portion of financial behaviour (Zhu, 2019). Such inconsistent results suggest that the empirical test, as to the importance of financial literacy as an indicator of behaviour of students in the context of structured educational interventions, is necessary.H5: Financial literacy does not significantly predict financial behaviour after the intervention.

III. Methodology

This study employed a quasi-experimental quantitative design with a pre-test and post-test non-equivalent control group, considered suitable for evaluating the causal effects of educational interventions under field conditions. The study sample was the secondary school students of Sandakan, Sabah, Malaysia, who studied the subject Economics. A sample size of 97 students was selected, comprising an experimental group (n = 49) with a financial literacy e-module, and a control group (n = 48) taught using conventional instruction.

The instrument consisted of structured questionnaires designed to measure two constructs: financial literacy and financial behaviour. Both constructs were assessed through Likert-scale items adapted from validated instruments. The financial literacy dimension emphasized on the knowledge of students on saving, budgeting and credit management whereas the financial behaviour dimension measured the practical issues like spending, saving and borrowing. Expert review was employed in establishing the content validity, and a pilot test was used to guarantee reliability with the Cronbach alpha value being more than 0.70. The analysis and determination of average scores was performed according to the classification of Hafizah Jamaluddin (2015) as shown in Table 1.

TABLE I. Interpretation of Financial Literacy/Behaviour

Mean Score	Interpretation of Financial Literacy/Behaviour
3.67 – 5.00	High
2.34 – 3.66	Moderate
1.00 – 2.33	Low

Source: Hafizah Jamaluddin (2015).

For this study, expert validation was sought to ensure the appropriateness of the research instrument. The questionnaire was reviewed by a panel of experts, including subject specialists and statisticians, to confirm the clarity, relevance, and accuracy of the items. This was followed by pilot test that included those students that were not part of the main study. A reliability test was performed on the results and the internal consistency of the instrument was established using Cronbachs alpha values of more than 0.70. The researcher was only able to collect the actual data after the validation was obtained.

The collection of the data was initiated by a pre-test to the control group and the experimental group. The experimental group was then taught the financial literacy e-module and the control group carried on with the traditional methods of teaching. Post-tests were conducted on both groups after the intervention was done.

The questionnaires were also given under the classroom supervision of the researcher with enough time of respondents to fill out the items. It was ensured that all the respondents

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answered without providing information that would violate the privacy of the respondents, and the school authorities involved in the study were approached to give consent in accordance with research ethics in the education field.

The answers were coded and tabulated and analysed with help of the several statistical techniques. The descriptive statistics gave an overview of the data with an inferential test, ANCOVA and MANCOVA, being applied to show a difference between the groups. Pearson correlation was also used in testing financial literacy and financial behaviour relationship and regression was carried out in establishing the predictive role of financial literacy on financial behaviour.

IV. Result and Discussion

This section presents the findings obtained from the statistical analyses conducted to examine the effects of the financial e-module on students' financial literacy and financial behaviour, gender differences in financial literacy, the relationship between literacy and behaviour, and the contribution of literacy in predicting behaviour. They were analyzed by multivariate and univariate approaches with the help of MANCOVA, ANCOVA, Pearson, and simple linear regression.

The descriptive analysis showed that students in the experimental group (KEE) recorded higher mean scores in both financial literacy and financial behaviour compared to the control group (KKK). As presented in Table II, the mean post-test score for financial literacy in the experimental group (M = 4.46, SD = 0.504, adjusted mean = 4.379) was greater than that of the control group (M = 3.33, SD = 0.851, adjusted mean = 3.414). Similarly, the mean post-test score for financial behaviour among experimental students (M = 4.17, SD = 0.595, adjusted mean = 4.135) exceeded that of the control group (M = 3.16, SD = 1.007, adjusted mean = 3.195). These results indicate that students who were exposed to the e-module achieved better outcomes in the areas of knowledge and behaviour than those who pursued the conventional learning method.

TABLE II. Interpretation of Financial Literacy/Behaviour

Variable	Group	Mean	SD	Adjusted Mean
Financial Literacy	Experimental (KEE)	4.46	0.504	4.379
	Control (KKK)	3.33	0.851	3.414
Financial Behaviour	Experimental (KEE)	4.17	0.595	4.135
	Control (KKK)	3.16	1.007	3.195

The multivariate analysis of covariance (MANCOVA) revealed a significant overall effect of the teaching method on the combined dependent variables, $F(2, 99) = 28.819$, $p < .001$. . This means that the use of the e-module contributed significantly to the financial literacy of students as well as the financial behaviour. These results were confirmed by the following. The subsequent univariate ANCOVA tests (Table II) further confirmed these findings. The results for financial literacy showed a significant effect, $F(1, 93) = 59.048$, $p < .001$, $R^2 = .407$, and for financial behaviour, $F(1, 93) = 30.306$, $p < .001$, $R^2 = .276$. These results indicate that the financial e-module was effective in enhancing the understanding that the students have on financial concepts and practical use of finance in financial management

TABLE III. ANCOVA Results for Financial Literacy and Financial Behaviour

Dependent Variable	F	p	R^2
Financial Literacy	59.048	.000	.407
Financial Behaviour	30.306	.000	.276

As shown in Table III, ANCOVA results revealed a statistically significant effect of the e-module on both financial literacy and financial behaviour. For financial literacy, $F(1,93) = 59.048$, $p < .001$, $R^2 = .407$, and for financial behaviour, $F(1,93) = 30.306$, $p < .001$, $R^2 = .276$. These findings support the view that the e-module implementation has a significant positive influence on the financial learning of students. This observation aligns with the principle of module design used by Meyer (1988) and the Theory of Planned Behaviour by Ajzen, (1991) because the more the knowledge and perceived behaviour control an individual has, the better the financial behaviour. Moreover, the concept of ectivist learning model (Siemens, 2004) reinforces the notion that online communication improves the levels of conceptual learning and behavioural rehearsal in the field of financial education.

TABLE IV. Gender Differences in Financial Literacy

Gender	Mean	SD	F	p	R^2
Male	3.62	1.063			
Female	4.05	0.746	5.065	.027	.079

The analysis in Table IV revealed a significant difference in financial literacy between male (M = 3.62, SD = 1.063) and female students (M = 4.05, SD = 0.746), $F(1.94) = 5.065$, $p = .027$, $R^2 = .079$. Female students recorded slightly higher literacy levels, which means that they were more receptive to the e-module. This observation aligns with Sabri and Falahati (2011), who opined that female students tend to be more enlightened and wise when it comes to administering finances. However, the small effect size suggests that the e-module was an effective one that benefited both genders in general, which supports its overall effectiveness.

TABLE V. Correlation between Financial Literacy and Financial Behaviour

Variable	1	2
1. Financial Literacy	—	.805***
2. Financial Behaviour	.805***	—

Table V presents the correlation between financial literacy and financial behaviour, indicating a strong positive relationship ($r = .805$, $p < .001$). This is an indication that better financial behaviour was also observed in students who were more literate. The outcome supports the Theory of Planned Behaviour as suggested by Ajzen (1991), which is that the enhancing knowledge and attitudes result in the favouring of behavioural intention, and performance. It also confirms the conclusions of Rahim et al. (2022), who mentioned that learning tools in form of digital platforms promoted cognitive and behavioural engagement in students.

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TABLE VI. Regression Analysis between Financial Literacy and Financial Behaviour

Predictor	β	T	P	R^2
Financial Literacy	.805	13.227	.000	.648

Regression analysis (Table VI) revealed that financial literacy significantly predicted financial behaviour, $\beta = .805$, $t = 13.227$, $p < .001$, $R^2 = .648$. This means that 64.8% of the variance in students' financial behaviour was explained by financial literacy. These findings suggest that the e-module was of significant value in development of better behavioural outcomes owing to enhanced financial knowledge. The conclusion coincides with the ADDIE instructional model, which proves that an organised learning plan can be used to increase behavioural change.

Overall, the results demonstrate that the financial e-module effectively enhanced students' financial literacy and behaviour. The high correlation and predictive relationship of these constructs authenticates the success of the module to facilitate knowledge acquisition and behavioural change. The findings can be empirical evidence that theory-based digital learning strategies may be applied to financial education.

V. Other Recommendations

Teachers are encouraged to integrate the e-module as a supplementary tool in Economics instruction, emphasizing real-life applications of financial decision-making. School leaders should facilitate the use of technology by providing access and support for e-learning infrastructure. It is advisable that the Ministry of Education (MOE) should explore the idea of integrating e-learning related to financial literacy in the national education curriculum, as it is within the Digital Education Policy of Malaysia and the objective of the country in terms of producing financially savvy nationals.

As a researcher, perspective research is to examine the effect of implementation of e-module in the long term and its influence on long-term behavioural change. The scope needs to be extended to other regions or types of schools to have a more detailed picture of its effectiveness. Furthermore, developers ought to add more modules in the future including gamification, interactive simulations and localized financial scenarios to raise the engagement and motivation.

Overall, this study provides empirical evidence that a theory-driven and well-structured e-module can effectively improve students' financial knowledge and behaviour. The integration of such digital learning tools supports Malaysia's efforts toward holistic, technology-enabled, and competency-based education.

VI. Conclusion

The study concluded that the implementation of the financial e-module had a significant and positive impact on students' financial literacy and financial behaviour in the subject of Economics. Findings from the ANCOVA test revealed that students who used the e-module achieved higher adjusted mean scores than the students who were being instructed in a traditional way. The strong correlation ($r = .805$, $p < .001$) and regression analysis ($\beta = .805$, $t = 13.227$, $p < .001$, $R^2 = .648$) demonstrated that financial literacy is a strong predictor of financial behaviour. The findings will support the assumption that digital learning tools may successfully promote knowledge and behavioural competencies in secondary school students.

Theoretically, this study provides empirical support for Meyer's (1988) model of module development, the ADDIE instructional design framework (Branch, 2009), Ajzen's (1991) Theory of Planned Behaviour, and Siemens' (2004) Connectivism theory. All these frameworks demonstrate the relevance of the organized de sign, the organized action and systematic engagement in creating behavioural change. All in all, the research shows that properly constructed and theoretically informed e-modules can be effective pedagogies in enhancing financial literacy of learners and creating responsible financial behaviour.

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