

Islamic Financial Literacy in Mathematics Education: A Proposed Framework

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ABSTRACT

Islamic financial literacy (IFL) has become ever more significant for Indonesian pupils related to the development of Islamic economics or known as Sharia economics, in Indonesia. Based on the mathematics curriculum, there is an area to integrate IFL in mathematics education, especially in social arithmetic. In this paper, we develop a Mathematics-based IFL framework for producing a set of mathematics tasks to promote students' Islamic financial literacy in Islamic schools. The framework concept is based on financial literacy, mathematical literacy, and Islamic economic principles. We carried out three main stages to develop the framework, namely, prototyping, focus group discussion, and expert review. The resulting framework, namely mathematics-based Islamic financial literacy (MIFL) provides the conception of how mathematics' tasks can be used to deliver messages related to Islamic financial literacy. In this case, we underline two things, first the content knowledge domain and the context domain of mathematics based IFL. By using this framework, it is expected that teachers, especially in Islamic schools, can develop their own mathematics' tasks which also aim to improve students' IFL abilities. In addition, this framework can also be used as a reference for measuring students' IFL abilities related to the numeracy tasks.

Keywords: *Islamic financial literacy, Mathematics education, Framework.*

1. INTRODUCTION

Financial literacy (FL) knowledge of students is currently one of the main concerns in education. The Organization for Economic Country Development (OECD) has even included the FL category as one of the assessment domains since 2012 in the study of student literacy skills that have been held since 2000 [1]. OECD [2] stressed that financial education is important for the student before they become active consumers. Furthermore, some studies emphasize the importance of financial education at an early age [3-4]. This implies that financial literacy should be part of the education curriculum in schools, or at least integrated into certain subjects. Because Islamic economic system is implemented in Indonesia then Islamic financial literacy (IFL) should be included in school education as well, especially in Islamic schools.

The Sharia economic development program is designed by Bank Indonesia (BI) is closely related to

Islamic School which is a model of Islamic boarding education in Indonesia. One of these programs is the strengthening of the Sharia economy in the Halal Value Chain where the economic independence of Islamic (boarding) schools is involved in the program [5] (Deputy of Economy Indonesian Ministry of National Development Planning, 2018). In addition, Piliyanti [6] also reinforces that basic education about Islamic economics should be carried out at the secondary school level at schools in Islamic schools. Therefore, integrating the IFL in schools can be a solution that is in line with the objectives of Sharia economic development which is officially carried out by the Indonesian Government.

Conceptually, financial literacy and mathematical literacy have an intersection in content that requires basic arithmetic skills to solve financial problems [1]. In addition, Yeo [3] emphasized that financial literacy should be integrated and parenthesized into mathematics education. Hence, we propose a framework for

assessing students' Islamic financial literacy, but just for domains that intersect with mathematical concepts, especially in social arithmetic. We develop the prototype by referring to the OECD FL theoretical framework, then filtering the content domain that intersects with mathematical concepts and adjusting based on the Islamic economic principles and curriculum.

Gravemeijer, & Doorman [7] and Van Den Heuvel-Panhuizen [8] stressed that the problem situation or context plays an important role in developing mathematical concepts. Hence, the integration of financial literacy content, which has a role as a context in mathematics education, can also improve the quality of mathematics learning and students' understanding. Therefore, the integration of financial literacy in mathematics learning has a positive impact on both students' understanding of mathematics concepts and financial literacy. Hence, from mathematics education perspective, financial problems as context or 'problem situation' in mathematics education play an important role in mathematics education. However, in terms of financial literacy, the concept of mathematics is an important basic concept in financial literacy. The OECD [9] emphasizes that, in general, students who perform at higher levels in mathematics also have a good performance in financial literacy. This indicates a positive correlation between financial literacy and students' mathematical abilities.

In secondary school, knowledge of financial literacy intersects some domain areas in mathematical concepts, specifically in basic arithmetic which requires students to perform a basic calculation before making appropriate financial decisions. The OECD [1] defines four content domains for financial literacy, namely, money and transactions, financial planning and management, risk and reward, and financial landscape. Across all content categories, students need good arithmetic skills before they can make financial decisions. For example, in the case of financial planning and management, the problem of determining installment schemes with different terms, of course, requires the ability to calculate to determine which scheme is more profitable.

Based on the Indonesian curriculum, one of the junior high school learning outcomes is students be able to perform arithmetic operations on a variety of numbers in several ways and use them in solving problems. The interpretation of the word 'problem' based on the official Indonesian mathematics textbook is a financial problem, specifically on "single interest" in conventional banking.

However, in Islamic economics, "interest" is not in accordance with Islamic principles. In Islamic economics, "profit-sharing" is used instead of using "interest". The banking products are carried out based on the contract

instead of the commercial orientation [10]. The concept of profit sharing is realized in several types of contracts, including *mudhorobah*, *musyarakah*, and *murabahah* [11]. Therefore, the context of "interest" in the material of social arithmetic can be converted into the context of the three types of contracts.

2. METHODS

We carry out the framework development process by conducting theoretical studies related to the concept of financial literacy, mathematics content (based on the Indonesian curriculum), and Islamic economic principles. We formulate the conceptual development framework for composing the initial prototype of the framework. Then we made improvements by conducting a focus group discussion (FGD). In this stage, we involved three colleagues who have expertise related to learning design and mathematical literacy. After the FGD, we got the draft of the framework. In the last stage, experts were involved to validate the draft of frameworks in terms of conformity with Islamic economic and mathematics education. We involved 2 experts, one mathematician, and an Islamic economist. We use expert suggestions to improve the framework. We also produced 1 draft sample question that was developed based on the framework.

3. RESULTS AND DISCUSSION

In developing the theoretical framework, we analyze three parts of the domain that must be included. Firstly, is the FL content on PISA. We chose the content domain in FL because it represents the main concept of financial understanding. We override the 'context' domain in PISA FL since financial problems are always tied to a certain context. Hence, the context in the framework will be adjusted to context related to Islamic financial products.

Secondly, is the mathematical concept dimension. At the secondary school level in Indonesia, the financial context is taught in social arithmetic. Students learn to understand the application of mathematics in solving the savings interest and loan interest problem. In this case, we convert the problem into a context unit that is in accordance with Islamic economics principles.

Third, is the Islamic economic dimension. In this case, we choose various types of Islamic transaction contexts according to the dimensions of mathematical and financial concepts. We define the intersection of the three dimensions as mathematics-based Islamic financial literacy. Figure 1 illustrates the relationship between three dimensions. The next stage is FGD. We received suggestions from several experts to construct a more systematic framework developmental process. Therefore, we construct a diagrammatic representation of the developmental process (Figure 2).

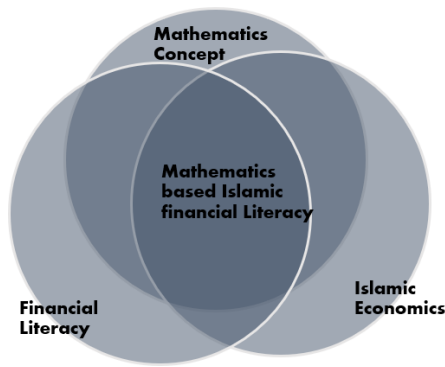


Figure 1 Mathematics-based IFL.

In terms of Islamic financial literacy measurement, Nawi et al. [12] limit it to several contexts, namely the concept of money, Islamic banking, takaful, and Shariah-compliant investment. This provides clear boundaries that IFL is a measurement of understanding about Islamic financial products. Therefore, based on the context of social arithmetic at secondary school, the “problem” related to Islamic banking is the most appropriate to replace the problems in conventional banks. There are numerous types of contracts used in Islamic bank products, such as *Wakalah* (agency), *Mudharabah* (profit sharing), *Ijarah* (leasing), *Istisna* (purchase order), *Murabahah* (cost plus), *Musharakah* (profit and loss sharing) [10]. However, it should be limited to a few simple Islamic banking products that are similar to the concept of interest in conventional banks. Hence, we choose several contexts of Islamic bank products with *Murabahah*, *Musharakah*, and *Mudharabah* contracts. At the expert review stage, we got some notes from the expert. Their important notes which also strengthen our draft framework (see Table 1).

Table 1. Experts’ comments

Expert	Comment
#1	Is the content domain of mathematical literacy related to financial literacy only in quantity? Because it seems that the problem in financial literacy can be developed more broadly, so that it is related to other content such as change and relationships, as well as uncertainty and data.
#2	It is necessary to emphasize to students the definition of each contract (e.g., <i>mudharabah</i> or <i>murabahah</i>) used in transactions in Islamic banking so that the use of new terms does not make it difficult for students.

Based on Expert #1, it is still possible to involve other mathematical content besides quantity in math-based Islamic financial literacy (as we know, OCED divides mathematical content into four parts, namely Quantity, Change and Relationship, Space and Shape, and Uncertainty and Data). Although this is possible, we still limit it to quantity content only. This is because we adapt to the social arithmetic material in the applicable curriculum so that this framework can be applied in regular learning. Meanwhile, Expert #2 emphasizes the clarity of definitions presented to students in the context unit (the contract used). In applying the framework, we will try to keep students from being preoccupied with memorizing contract names. Therefore, in each math-based IFL task, we will provide a definition and emphasize the meaning of the contract (Figure 2) and domains (Table 2).

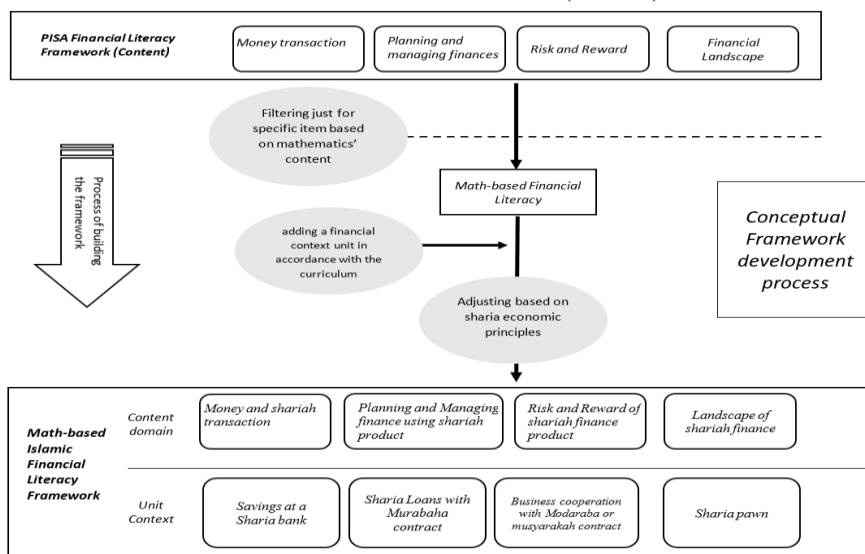


Figure 2 Conceptual framework developmental process.

Table 2. Math-based IFL framework

	Domain	Description	Key Idea
Content	Money and shariah transaction	Understand and be able to monitor calculations related to buying and selling transactions and finance in Islamic banking	PISA Analytical Framework, Curriculum (Social arithmetic), sharia principles
	Planning and Managing finance using shariah product	Ability to utilize income or other sources to improve financial well-being through various Sharia financial products based on consideration of arithmetic calculations performed (e.g., Sharia banks, Sharia insurance, etc.)	
	Risk and Reward of shariah finance product	Understand that Islamic financial products offered by banks or other Islamic financial institutions have profit and risk factors through arithmetic calculations carried out.	
	Landscape of shariah finance	Understand that external factors affect the Islamic financial products used based on the arithmetic calculations performed. (e.g., increase in gold price)	
Context	Savings at a Sharia bank	sharia time deposits from banks whose profits are in the form of profit-sharing or ratios with a certain time.	Conversion from the context of savings interest (conventional banks) in social arithmetic problems.
	Sharia Loans with <i>Murabahah</i> contract	A sale and purchase contract in which the price and profit are agreed upon between the seller and the buyer. The types and quantities of goods are described in detail. The goods are delivered after the sale and purchase agreement and payment can be made in installments or all at once.	Conversion from the context of interest-bearing loans (banks or cooperatives) in social arithmetic problems.
	Business cooperation with <i>Mudharabah</i> contract	The contract is made between the investor (<i>shahibul maal</i>) and the entrepreneur (<i>mudharib</i>) where the profit-sharing ratio is agreed at the beginning, while the loss is borne by the investor.	
	Business cooperation with <i>Musyarakah</i> contract	A contract between two investors in a particular business, while the executor of the business can be appointed by one of them. the profit-sharing ratio is agreed upon at the beginning.	
	Syariah Pawn	Pawnshop activities where the customer is not subject to interest, which is collected from the customer, is the cost of custody of the pawned goods (<i>Ijarah</i> contract). the amount of the <i>ijarah</i> tariff is determined based on a certain ratio formula.	One context in Islamic finance

The framework provides a more systematic description to stimulate mathematics teachers to think about ways in which Islamic Financial Literacy can be promoted through mathematics lessons. The two domains developed are expected to help teachers develop activities that mediate the integration of Islamic financial literacy into mathematics education. The framework articulates schemas on mathematical concepts with the category of Islamic financial literacy that is often used in general.

Designing mathematics task or problem using the framework, it can be started by choosing a specific

content domain, then adding an appropriate context unit. Afterward, the problem can be expanded further by choosing a particular form of question. The following is an example of a mathematical task on specific content and context units that can be integrated into the teaching and learning of mathematics at secondary level.

Content: Money and shariah transaction
Context unit: Savings at a Sharia bank

The Ummah Sharia Bank provides a monthly profit sharing for the bank’s business for customers who save at the bank. The following is the calculation of profit-sharing for customers.

$$\text{Customers' profit-sharing} = \frac{\text{Balance}}{1000} \times 6.5 \times \text{Nisbah}$$

Nisbah = Percentage of profit-sharing for customers

Question:
 The following is a list of bank transaction mutations in Mr. Ayub’s account.
 Account number : 010111xxx
 Name: Mr. Ayub
 Periods : 1 Feb 2020 -16 Feb 2020
 Currency: IDR

Date	Transaction Details	Credit (IDR)	Debit (IDR)	Balance (IDR)
3/2/20	Administration fee		15,000	15,000,000
3/2/20	Profit-sharing	30,000		15,030,000
4/2/20	X Company January Salary	4,500,000		19,530,000
7/2/20	Withdrawal		2,000,000	17,530,000
16/2/20	Transfer Mr. Fulan 0011	700,000		18,230,000

Determine the amount of the *nisbah* given by the Ummah Sharia Bank to Mr Ayub!

Figure 3 An example of IFL task.

Teachers can develop other questions by combining context and content units in the framework. Although there are four content and five context areas, it does not imply that 20 types of mathematical tasks can be developed with different combinations. This is because the defined context unit is only to facilitate the math task designer in determining the context among numerous existing Islamic financial contexts.

In general, the math-based Islamic financial literacy task is adapted from PISA’s framework. Consequently, the task’s form is similar to the mathematical literacy in PISA. Several studies have revealed the potential effects of PISA-like problems, including supporting students’ reasoning, communication, problem-solving strategies, representation, and mathematizing and creativity motivate students to work on the context-based problems [13-16]. Hence, it can be convinced that the potential effects obtained using the math-based Islamic

financial literacy assignment will also be similar to the PISA-like mathematics tasks. In addition, using this framework means teaching mathematics through a financial context approach. This will certainly increase students’ opportunities in understanding mathematical concepts [7,17]. Furthermore, by using this framework, students will get two opportunities, namely learning mathematical concepts and Islamic financial literacy at the same time,

4. CONCLUSION

To foster IFL, especially in Islamic schools, it takes a long period through the selection of the right tasks by mathematics teachers. We are giving sample questions here to provide an overview of some math tasks that a secondary school math teacher might consider developing math tasks that can also improve Islamic financial literacy. In closing, we hope that this

framework will not only help students to become critical and creative mathematics learners but also in the future can make them more aware and play a role in the progress of the Islamic economy in Indonesia.

AUTHORS' CONTRIBUTIONS

Intan Bigita Kusumawati: Research coordinator and conceptualization framework. Achmad Dhany Fachrudin: Developer of Math-based IFL tasks, data analyst. Ratu Ilma Putri: Script reviewer, expert and concept consultant. Zulkardi: Expert and concept consultant. Ahmad Wachidul Kohar: Manuscript editing, review of developed tasks. Muhammad Khusni Mubarak: Director and expert on sharia economics.

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