

## POINT TO PONDER: A story about research

John initially has RM 50. After spending RM 20, he is left with RM 30. Subsequently, he spends an additional RM 15, leaving him with RM 15. After spending RM 9 more, he is left with RM 6. Finally, he spends another RM 6, resulting in a balance of RM 0.

From the statement above, we can make a table as follows:

SPEND	BALANCE
RM 20	RM 30
RM 15	RM 15
RM 9	RM 6
RM 6	RM 0
TOTAL: RM 50	TOTAL: RM 51

The question raised is why the total balance exceeds RM 1 more than the total spending, which amounts to RM 50.

Upon reviewing the table, it is evident that the addition and subtraction operations have been carried out correctly, without errors.

However, the primary flaw lies in the methodology employed for this analysis. It is erroneous to simply add up the remaining balances and compare the total to the initial input (in this case, John's initial amount of money).

The discrepancy arises because the remaining balance cannot accurately reflect the initial input amount.

Therefore, the fault lies not in the mathematical calculations, but rather in the flawed research methodology utilized in this scenario.



Furthermore, it's important to note that any flaws in the research methodology can be discerned by the researchers themselves.

Researchers have the ability to conduct simple tests to assess the validity of the research methods employed. There isn't a singular formula or approach that can definitively determine the accuracy of research methods, as they vary depending on the type of study being conducted.

The optimal approach is to learn research methods from experienced lecturers at their respective institutions, as they offer invaluable expertise.

Returning to the example provided earlier, researchers can evaluate the validity of the method used to sum expenses and balances as either correct or incorrect.

This can be achieved by altering the position of the spent value.

SPEND	BALANCE
RM 20	RM 30
RM 6	RM 24
RM 9	RM 15
RM 15	RM 0
TOTAL: RM 50	TOTAL: RM 69

The underlying principle is that, irrespective of the amount spent, John can only purchase goods worth RM50, as that is the entirety of his funds.

In the realm of mechanical engineering, this concept is akin to the “conservation of mass” principle.

Suppose John spends RM 6 in his second expenditure, as indicated in the table above. Upon examination, we observe that John's total expenditure remains constant at RM 50.

However, the total balance spent by John increases from RM 51 to RM 69.

This discrepancy highlights the inadequacy of the approach of summing the balance values as a valid research method.



Although occasionally the spending amount and the balance amount may coincide, such instances are merely coincidental. The crucial point to grasp is that this method is flawed when it comes to validation in this context.

SPEND	BALANCE
RM 0	RM 50
RM 50	RM 0
TOTAL: RM 50	TOTAL: RM 50

Among other methods to establish the incorrectness of summing the balance, researchers can employ mathematical formulas.

From the table above, it is evident that the total of the balance column does not match the total of the expenditure column.

Hence, the practice of comparing expenditure and balance amounts cannot be considered valid.

Among other ways to determine the method of summing the balance is wrong, researchers can prove it by means of mathematical formulas.

SPEND	BALANCE
$B_1$	$50 - B_1$
$B_2$	$50 - B_1 - B_2$
$B_3$	$50 - B_1 - B_2 - B_3$
$B_4$	$50 - B_1 - B_2 - B_3 - B_4$
$50 = B_1 + B_2 + B_3 + B_4$	$200 - 4B_1 - 3B_2 - 2B_3 - B_4$

From the table above, we can clearly conclude that the sum of the balance column is not the same as the sum of the expenditure column.

Therefore, the method to compare the amount of expenditure and the balance cannot be used at all.

One lesson to be gleaned here is that each research endeavor requires its own methodology. There are instances where calculations may be accurate, yet the methodology fails to align with the study's objectives.

This discrepancy is perilous as it can yield erroneous information and conclusions. However, it is possible to independently assess the research methodology. We have the ability to scrutinize whether the methods employed are appropriate or flawed, given our intimate familiarity with the study.

It is hoped that students can fully engage with the Research Methodology course as it serves as the foundational step towards producing high-quality research.

Moreover, we can infer that to ensure the accuracy of our methodology, conducting a thorough literature review is essential.

## What is literature review?

A literature review in research is a critical analysis and synthesis of existing literature and research relevant to a particular topic or research question. It involves systematically gathering, evaluating, and interpreting scholarly articles, books, and other sources to provide an overview of the current state of knowledge on the topic.

The purpose of a literature review is multifaceted:

**Identifying gaps:** It helps identify what is already known about a topic and areas where further research is needed.

**Establishing context:** It provides the context for the research by summarizing previous studies, theories, and findings related to the topic.

**Informing methodology:** It aids in selecting appropriate research methodologies by highlighting methods used in previous studies and their strengths and limitations.



Supporting arguments: It supports the rationale for the current study by demonstrating how it builds upon and contributes to existing knowledge.

Avoiding duplication: It helps researchers avoid duplicating previous work by synthesizing existing findings and identifying areas where original contributions can be made.

Overall, a literature review is a crucial component of the research process, providing a solid foundation for designing and conducting new studies and advancing knowledge in a particular field.