Enhancing Secondary Students' Learning Motivation and Understanding of Simultaneous Equations Using Real-World Examples and Visualization Strategies

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Introduction

Problem: During my teaching practice, it is found that students have low motivation in learning the topic of simultaneous equation, especially in graphical solution and the method of elimination.

Objective: Investigate whether the task design using real-life examples and visualization technique can increases students' motivation.

Significance: Every students in Secondary 2 need to learn the topic. This topic lies the foundation on studying the intersection between a curve and a line, the 3 x 3 system of linear equations and algorithm for solving linear equations in engineering mathematics. Therefore, tackling the motivation problem is important for students to carry on in the mathematics journey.

Literature Review

Students' Motivation and Engagement:

- 3 aspects, 5 levels of engagement influences learning motivation
- Four perspective in measuring motivations
- Can be improved by proper choice of learning activities

Real-life examples:

- Help making mathematics meaningful.
- Improve motivation by usefulness

Visualization Strategies:

- Reduce cognitive load which intrinsically and extrinsically motivate students

Gap: Task design with outdated and tedious real-life examples, visualization focus on graphical solution only

Research Questions

Central: How does the use of visualization strategies and real-life examples help enhance local secondary 2 students' motivation in learning the topic of simultaneous linear equations in two unknowns?

Perspective of the sub-questions: Improvement of motivation and understandings, effectiveness and amendments.

Findings

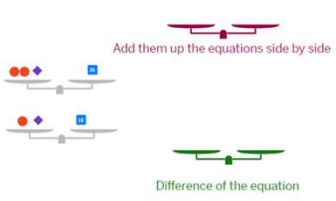
Scores increase in Post-Test due to p-value < 0.05

Car Meeting Examples provide higher motivation

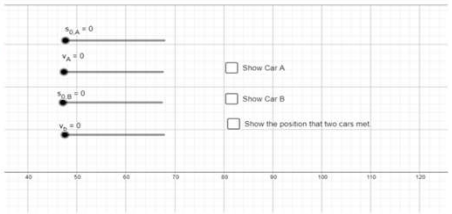
The motivation measure is higher in School A

Methodology

Two Task Designs for Two Band 2 School(School A and School B)



Visualization on Method of Elimination



Visualization on Real-life Example (Car Meeting)

Method of Data Collection in two TP Schools (A and B)

- Quantitative Data

Pre-test, Post-test comparison, Questionnaire Results

- Qualitative Data

Questionnaire(Opinion Questions), Teacher Log and Interview after the implementation

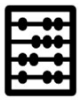
Technique for Analysis:

Statistical Test(Paired t-test and Two Sample t-test), Likert Scale(5 points) Analysis , using insights from the qualitative Data

Discussions

It matches the literature which visualization strategies and real-life examples work.

The car meeting example shows a meaningful representation of the graphical solution.



School Culture affects how students react to lesson activities.

Limitation:
A sample is too small (66 students)
Marginal responses are given.
It is not comprehensive enough to cover all the topics of simultaneous equations.

Future studies

1. About teaching simultaneous equations of a quadratic and a linear equation, linear system, and linear algebra in Year 1.
2. Teaching of Linear programming