Title:

Solving simultaneous equations in context to illustrate the basics of mathematical modelling.

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Institution:

Institute of Mathematics and Science Teaching, University of Stellenbosch (IMSTUS)

Target audience:

Mathematics educators, Further Education and Training Band (FET), Grades 10-12

Description of the content of workshop

Content

Using simultaneous equations in context to illustrate mathematical modelling by:

- Developing formulae from a contextual problem.
- Generating patterns using tables to interpret solution.
- Drawing graphs using tables and the formulae to interpret solution.
- Developing tables, graphs and formulae to solve simultaneous equations in context (word problems)

The investigative activity will be focusing on the interrelated aspects of Mathematics by focusing on the following skills and knowledge:

- Numbers and relationships
- Patterns, functions and algebra
- Representation and interpretation
- Problem solving and investigation
- Describing and analyzing via mathematical modelling

What will be done in the workshop/participant involvement

Participants will:

- Read and engage with the material
- Involve themselves in small group discussions
- Complete the tables and draw accurate graphs
- Develop algebraic equations to express the relationships between the variables
- Make conclusions based on pattern recognition using the tables, formulae and graphs

Time allocation

- Read and understand the material
  – 10 min
- Involve themselves in small group discussions, develop plan to solve problem – 20 min
- Complete the tables and draw accurate graphs
  – 30 min
- Develop algebraic equations to express the relationships between the variables
  – 30 min
- Make conclusions based on pattern recognition using the tables, formulae and graphs
  – 20 min
- Related discussions
  – 10 min

Motivation for running workshop

- To highlight the importance of the use of simultaneous equations in everyday life, by putting the problem in context.

- To expose educators to mathematics material that facilitates mathematical modelling via self-exploration and self-activity. Many textbooks approach the topic of simultaneous equations from a formal mathematics perspective. The contextual approach will help educators move from the informal to the formal.

- To introduce problem solving skills in mathematics within the classroom, albeit in small steps.

- To introduce practical teaching methodologies based on constructivism and realistic mathematics.

- To develop skills and knowledge to effectively teach this content

- To illustrate the flexibility of the material by compiling assessment activities

Abstract

Simultaneous equations have always been taught in a very formal and abstract manner in the classroom. Not much attention was given to the importance of simultaneous equations within the function context and very little on how it can be used as a powerful tool to teach the basics of mathematical modelling. This session aims to show teachers how to teach simultaneous equations from a contextual perspective by developing formulae, generating patterns using tables and drawing graphs to analyse and interpret the solution. This approach forms the basis for doing mathematical modelling by showing the interrelatedness of numbers, patterns, functions and algebra.