A model for the conceptual learning of mathematics in a technologically enhanced environment for first-year prospective mathematics teachers
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Introduction

- Conceptual mathematical knowledge reason for concern
- Not adequately prepared
- Teachers themselves must possess profound knowledge
- Reasons why learners do not learn mathematics with understanding
Research question

• What is the influence of a technologically enhanced environment on the conceptualisation of student teachers regarding the function concept
• Model for the conceptual learning of functions in technologically enhanced environment for first year student teachers

Role of technology

• Influences meaningful learning of mathematics
• Enhances conceptual learning
• Higher order thinking skills
• Geometer’s Sketchpad powerful learning tool
• Engages student teachers in learning process
• Provide greater flexibility in active learning process
• Technology as master
• Technology as servant
• Technology as partner
• Technology as extension of the self

Mathematical knowledge of student teachers

• Conceptual knowledge
• Procedural knowledge
• Conditional knowledge
• Adequate knowledge as well as an awareness of that knowledge
• Metacognition
• Metacognitive knowledge and metacognitive control
Framework for conceptualisation of functions

- Modelling,
- Interpretation
- Translation
- Reification
- Four stages of Dreyfus:
  - Use of single representation
  - Parallel use of more than one representation
  - Making links between parallel representations
  - Integrating representations/ reification

Research method

- Explanatory mixed method design
- Quantitative: functions test as pre- and post-test
- Intervention: Geometer’s Sketchpad
- Class of 66 students taking maths as a major
- Qualitative: semi-structured and task-based interviews with group of 15 students
Results

• No improvement of conceptualisation regarding the function concept, except reification
• Positive attitude towards technology
• Regard technology as servant, master
• Only use one external representation
• More than one parallel representation
• Formal mathematical notation
• Metacognitive strategies

Conclusion

• Not prepared to benefit from technologically enhanced environment
• What can be done?
• Model:
  • Diagnostic assessment
  • Recommendations and support
  • Cognitive and metacognitive skills, affective factors and creation of advantageous technologically enhanced environment