

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

