

The role of learning functions in the shaping of new kinds of Mathematics teachers

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Orientation

Literature highlights the following:

- Under-achievement and poor achievement in Mathematics (Maree, Molepo, Owen & Ehlers, 2005; Van der Walt & Maree, 2007; Singh, Granville & Dika, 2002; Winicki-Landman, 2001).
- Learners do not understand mathematical concepts and cannot apply the concepts (Mwakapenda, 2004)
- Poor performance in the TIMMS and TIMMS-R – learners' mathematical knowledge is poor (Maree *et al.*, 2005; Reddy, 2005)

Factors that impact on learner achievement

Literature highlights the following:

- Motivation (Pintrich & Schunk, 2002)
- Expectations and self-worth (Folk, 2006)
- Attributions (Woolfolk, 2004)
- Goal orientation (Pintrich & Schunk, 2002)
- Self-regulation (Ertmer & Newby, 1996; Woolfolk, 2004)
- Quality learning environments (Folk, 2006)

The acquisition of learning functions is not mentioned as a factor that can influence learning and achievement



**In this presentation we argue:
The quest for effective teaching
and learning in order to enhance
academic achievement depends
on**

A proper balance between teaching and learning

Linking teaching to learning functions

The place of learning functions during teaching and learning

In order to determine the place of learning functions during teaching and learning the concept “LEARNING” needs to be explored further.

1. Learning is goal oriented

2. Learning is linking information to prior knowledge



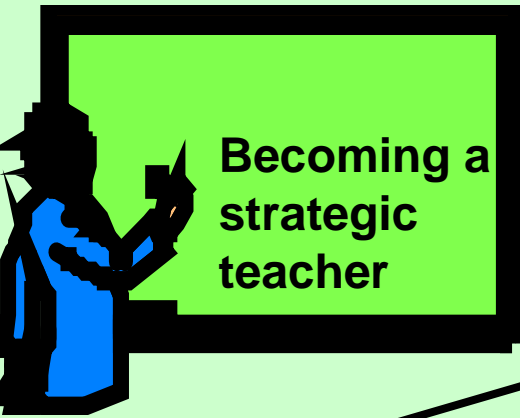
6. Learning is influenced by development

What is learning?

3. Learning is organizing information

5. Learning occurs in phases, yet non-linear

4. Learning is acquiring cognitive and meta-cognitive learning skills, functions and strategies



Procedures for linking teaching to learning

Thinking and making decisions

1. Aligning the variables of instruction

2. Relating content and instruction to learning

3. **Developing effective skill/function and strategy instruction**

4. Relating assessment to learning and instruction

5. Considering contextual constraints

Critical/core functions

1. Expectations
2. Motivation
3. Prior knowledge activation
4. Attention
5. Encoding
6. Feedback
7. Planning
8. Monitoring
9. Evaluation

Learning functions:

Mental activities that need to be applied to learning tasks

Functions that go beyond memorizing information

(Shuell & Moran,

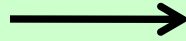
Specific functions

1. Comparison
2. Hypothesis generation
3. Synthesis
4. Classify
5. Summarize
6. Infer
7. Explain
8. Apply
9. Analyze

Learning functions for mastering Mathematics

- Decoding information
- Synthesizing information
- Integration of information
- Comparing information
- Application of information
- Generating hypotheses
- Reflection (planning, monitoring and evaluating) (Xin, 2005; Lang, 2005)

The importance of
learning functions



Independent
Confident
Active
Life long learners



Aim

To determine if the acquisition of learning functions can improve achievement in Mathematics

Method and design

- Literature study
- Mixed method (embedded)
- Qualitative (focus)
- Quantitative (True experimental research: post-test alone control group design)

Research

Data

Collection:

Observations
Testing
Assignments
Final exam

Population and

sample:

All prospective teachers with Mathematics as major subject

Convenient sample:

2008 1st year students
With Mathematics as
Major at NWU:VTC
(n = 23)

Statistical Techniques:

Descriptive and
Inferential statistics
Content analysis

Intervention programme

Intervention programme

Data analysis Observations

Data was analyzed to determine patterns and themes

Data analysis

Observations

Data analysis

Tests and assignment

Data analysis

Tests and assignments

Data analysis Exam

Data analysis Exam

Interpretation of Data

Interpretation of Data



Recommendations

Conclusions