ENHANCING STUDENT UNDERSTANDING OF MATHEMATICAL CONCEPTS THROUGH THE DEVELOPMENT OF ESTIMATION SKILLS WITH THE QAMA CALCULATOR

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ABSTRACT

The development of learners' understanding of mathematical concepts constitutes one of the crucial problems in STEM disciplines (bibliography).

The authors will report on the progress for far with the pilot study investigating the ways of developing students' understanding of mathematical concepts through the use of a QAMA scientific calculator. QAMA is a scientific calculator designed specifically to force the user to provide a "reasonable estimate" of the answer before giving any output. Preliminary results are described for a study in which the QAMA calculator was used for *Mathematics for Exercise Science*, a first-year cohort at Queensland University of Technology. The authors re-designed the unit with the aim of creating pedagogical activities that promote students' deep learning. The re-designed tasks required students to use the tool during a series of educational activities while learning the concept of mathematical estimation. The design of the task encouraged students to apply their previously acquired knowledge in the new contexts, allowing them to perceive the connection between their freshly learnt estimation skills with application in new contexts. The re-designed unit was introduced for the second semester of 2014.

THE ISSUE
OBJECTIVES
1. How to design pedagogical activities that promote understanding of the mathematical concepts using QAMA calculator (on the example of the particular unit)?
2. How to create learning environment that promotes students' deep learning within the particular unit?
3. How to evaluate the result of the intervention, i.e. provide evidence of a successful acquisition of the mathematical concepts by students enrolled in this particular unit?

THE APPROACH
The authors applied action research cycle at all stages of the research. More precisely, the study follows the research cycle, that is: conducting needs analysis, re-designing the unit, implementing the changes, collecting and analysing the data, reflecting on findings, designing further improvements, etc.