



Identifying and Evaluating Threshold Concepts in First Year Statistics courses at a large university in South Africa

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In the teaching of Statistics, certain central concepts/topics are experienced as more difficult to comprehend than others, especially within a group of students with diverse mathematical abilities. Misconception of such concepts/topics while studying Statistics on the 100 level, where the foundation of the discipline is laid, is problematic since it might prohibit the student from understanding and grasping the core concepts upon which the discipline is developed. These misconceptions will also influence the student's future studies of the discipline since no proper holistic view of the inner mechanics of the different procedures and techniques nor the interrelatedness of the different procedures and techniques will be present. Failure to master these concepts/topics could also restrict the progression within a course since in all Statistics courses topics/concepts build onto one another. These concepts are referred to as *threshold concepts* where a threshold concept is a conceptual gateway that opens up a new and previously inaccessible way of thinking without which you cannot progress in the subject. The purpose of this research is to identify the threshold concepts in 100 level Statistics at a large South African university in a three year longitudinal study, and to also determine their levels of difficulty (which describes how troublesome the concept is to master) and importance (which refers to how much follow up work is unlocked by mastering the threshold concept). A better understanding of the threshold concepts within the discipline of Statistics can give insight to educators on difficulties perceived by students which can be indicative to whether education models should be adapted and if so, how it must be adapted in order to improve the learning process, retention of knowledge and the throughput.

This study will seek to:

- verify which of the threshold concepts identified through literature are also experienced as threshold concepts among Statistics students on the 100 level,
- expand the existing list of already identified threshold concepts,
- determine the degree of importance for the observed threshold concepts as experienced by these students,
- determine the level of difficulty for the observed threshold concepts as experienced by these students.

The results discussed will be preliminary, based on data gathered in 2014 for the 100 level students of 2013 on whom the longitudinal study will be based. Data gathered additionally as part of a pilot study for the 2011 and 2012 first year students will also be analyzed along with the 2013 data.

Keywords: longitudinal study; interrelatedness; troublesome knowledge; misconceptions.