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LEARNING TO TEACH STATISTICS MEANINGFULLY

PhD THESIS

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ABSTRACT

Following international trends, statistics is a relatively new addition to the South African mathematics curriculum at school level and its implementation was fraught with problems. Since 2001 teaching statistics in the Further Education and Training Phase (Grades 10 to 12) has been optional due to lack of professional development of teachers. From 2014 teaching statistics will be compulsory. This study is therefore timely as it provides information about different discourses in discussions of an ill-structured problem in a data-rich context, as well as in discussions of the meaning of the statistical mean.

A qualitative case study of informal statistical reasoning was conducted with a group of students that attended an introductory course in descriptive statistics as part of an honours degree in mathematics education at the University of the Witwatersrand. The researcher was the course lecturer. Transcripts of the discussions in four video recorded sessions at the start of the semester long course form the bulk of the data. The discussions in the first three sessions of the course were aimed at structuring the data-context, or grasping the system dynamics of the data-context, as is required at the start of a cycle of statistical investigation. The discussion in the fourth session was about the syntactical meaning of the mean algorithm. It provides guidelines for meaningful disobjectification of the well-known mean algorithm. This study provides insight into informal statistical reasoning that is currently described as idiosyncratic or verbal according to statistical reasoning models.

Discourse analysis based on Sfard's (2008) theory of Commognition was used to investigate and describe discursive patterns that constrain shifting from colloquial to informal statistical discourse. The main finding is that colloquial discourse that is aimed at decision making in a data-context is incommensurable with statistical discourse, since comparison of data in the two discourses are drawn on incommensurable scales – a qualitative evaluation scale and a quantitative descriptive scale. The problem of comparison on a qualitative scale also emerged in the discourse on the syntactical meaning of the mean algorithm, where average as a qualitative judgement conflicted with the mean as a quantitative measurement. Implications for teaching and teacher education are that the development of statistical discourse may be dependent on alienation from data-contexts and the abstraction of measurements as abstract numerical units. Word uses that confound measurements as properties of objects and

measurements as abstract units are discussed. Attention to word use is vital in order to discern evaluation narratives as deed routines from exploration narratives and routines.

Keywords

Commognition
Discourse analysis
Exploration routines
Evaluation routines
Informal statistical reasoning
Informal statistical discourse
Statistical reasoning
Statistical discourse
Statistical literacy