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Enhancing teacher knowledge through an object-focused model of professional development

Moalosi, Shadrack Shadow

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ABSTRACT

This research was an exploratory study in which I was interested in the constitution of the enacted object of learning in an object-focused model of professional development and the lived object of learning for the participating mathematics teachers. The object-focused model of PD was a 5 year continous professional development which used secondary school mathematics content to strenghten mathematics teachers' knowledge of the content they taught in school.

To study the enacted object of learning I worked deductively with three theoretical resources. Firstly, I recriuted the notion of *patterns of variation* from Variation Theory to *visibilize* what was made possible for teachers to learn about functions. Secondly, to further explore the enacted object of learning I recruited the notions of the *duality of the object of learning* and *legitimating criteria* from Adler and Davis' (2006) methodology for studying mathematics teacher education to *illuminate* what was made possible to learn. Thirdly, I recruited Galileo's notions of *reality* and *appearance* to theorize the enacted object of learning. In my inductive analysis of the enacted object of learning I was interested in the nature of scaffold provided to teachers to discern the key features of functions. Two pedagogic strategies which were used to scaffold tasks emerged in the data and I described one as the *deductive* and the other as the *inductive pedagogic strategies*. While the former opened up scaffold, the latter closed it. To study the lived object of learning I recruited theoretical resources from phenomenology and Adler and Davis' (2006) notion of the *duality of the object of learning*.

Results from my analysis of the enacted object of learning revealed that the deductive pedagogic strategy resulted in moderate or high scaffold, and the inductive pedagogic strategy resulted in low scaffold. In addition, analysis with patterns of variation together with notions of duality of the object of learning and legitimating criteria revealed that the enacted object of learning was *mathematical reality* (**Mt_{re}**) and *mathematical appearance* (**Mt_{ap}**). Analysis of the lived object of learning revealed that the teachers' experiencing of an object focused PD was constituted by *personal learning of functions; professional learning of functions; personal learning of teaching functions* and *professional learning of teaching functions*. Methodologically, this research has contributed tools which can be used to study the enacted and lived object of learning. Theoretically, this research has extended Adler and Davis' notion of **Mt** at the level of enactment by subcategorising it into Mt_{re} and Mt_{ap}. In addition, at the level of the lived object of learning, this research has extended both **Mt** and **Tm** into **Mt-pl; Mt-PL** and **Tm-pl; Tm-PL** respectively.