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Mathematics teachers' professional noticing in the teaching of inverse functions in Grade 12

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ABSTRACT

This paper discusses mathematics teachers' professional noticing in the teaching of inverse functions in Grade 12 in the South African context. The notion of 'professional teacher noticing' becomes key in teaching due to the teacher's interpretation of events becoming a challenge in a mathematics classroom (Davis, 1996). Thus, the paper looks deeper into how professional noticing may assist teachers to notice learner(s) mental constructions, reasoning and to attend to learners' thinking strategies. Furthermore, to interpret learners' mathematical understanding, and to gather the required responding skills when teaching inverse functions and graphs. A qualitative research approach was used to conduct this study, the data was collected through learners' pre-tests and post-tests and also from the intervention video-recorded lessons. For this study, the APOS (Action, Process, Object, Schema) theory was explored as an analytical framework to determine the learners' mental constructions concerning APOS conception levels. Another objective was to investigate teachers' professional noticing using Barnhart & van Es, (2015) sophistication noticing level as an analytical framework. The study aimed to explore elements of 'professional noticing' in an enacted mathematics lessons to enhance teachers' attending, interpretation, responding, and deciding strategies in a mathematics classroom. In collecting data, mapping professional noticing and APOS theory to the curriculum documents, pre and post-test assessments were conducted with Grade 12 learners. This study used 9 male and 9 female Grade 12 learners as participants and as part of the sample for the study. Additionally, there were two teacher participants (teacher A and teacher B) who participated in analyzing the video-recorded lessons taken during the intervention classes guided by designed questionnaires. The two teacher participants were considered for the study for the reason of minimizing biases and preconceptions for data analysis and the validity of the data collected. The study established that, through correct sophistication level of noticing and interrogation of the learner conception levels using APOS theory. Professional teacher noticing can develop learners with mathematics sense-making and critical thinking skills. The study established that the implementation of professional noticing in teaching practices was key to minimizing Grade 12 challenges of learning inverses functions. As a result, the study recommends that the notion of professional noticing be considered as a means to improve, transform teaching practice, and as a platform for a concrete framework on professional noticing in the learning of inverse functions in Grade 12.