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Teaching genetics to pre-service teachers: a teacher educator's approach to transformative practice through self-study

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ABSTRACT

This thesis reports on a self-study in which I generated knowledge about teaching through investigating my own teaching of genetics, a content course to pre-service teachers studying at university. The aim of the study was to investigate how to teach genetics for understanding of content and for teaching in pre-service teacher preparation. The participants were myself and the students registered for Life Sciences III in 2013 at Wits University in South Africa. Being a self-study, I was both the researcher and the researched. I used multiple methods of data collection. The data included the documentation of my planning for teaching the genetics course, journal entries of my thoughts and reflections, notes from discussions with colleagues and from discussions with critical friends, video-recordings of my lecture proceedings and finally, interviews with students. In order to address validity issues concerned with the use of the self-study methodology, I engaged critical friends who mediated my thinking and my interpretations of the data throughout the study. In addition, I subjected my observations and interpretations of the data to other researchers and peers in the relevant research community for critique at various platforms. The data analysis was both deductive and inductive. The deductive analysis methodology was informed by the PCK framework that I adapted from Davidowitz and Rollnick (2011).

In this study, I confirm that in order to effectively teach genetics (or any course) to pre-service teachers, it is important that teacher educators plan their teaching well. The study shows that in order to plan effectively, teacher educators must possess the four domains of a teacher's knowledge, namely; knowledge of context, knowledge of students, pedagogical knowledge and knowledge of content. The study extends the existing knowledge of the four domains of a teacher's knowledge by contextualizing it to teacher education. This is achieved by demonstrating that in order to effectively teach pre-service teachers; teacher educators must in addition to possessing the knowledge of their context, knowledge of their students, pedagogical knowledge and knowledge of content, they should also have the knowledge of their students' (the pre-service teachers) future contexts, knowledge of their students' future students (that is school learners), knowledge of pedagogical techniques for teaching their students' students and knowledge of content for teaching in schools. The findings of the study confirm the need for

induction of beginning teacher educators (BTEs) and for professional development programmes in higher education institutions. Furthermore, the study shows that research literature and professional peers are rich knowledge resources on teaching and metacognition is shown to be an effective way of developing novel teaching ideas.

The use of the concept of trigger incidents in the data collection and analysis, confirmed the importance of 'noticing' as teacher educators and of responding appropriately to what we notice. In addition, the trigger incidents revealed that when we display as teacher educators an attitude of caring towards our students, the caring attitude has the potential to develop in students a positive attitude towards their work which motivates them to participate fully in the whole teaching and learning process.

The discussions with critical friends led me to realise that I used constructivism in my teaching and this confirms the literature in which it is generally agreed that when an experience is shared with valued other, greater opportunities are provided for reframing of situations and of confronting one's assumptions about practice.

In this study, I demonstrate that when teaching a content course to pre-service teachers, it is possible and important to combine teaching for understanding of content and for teaching. I further demonstrate and confirm that one effective method of combining teaching for understanding of content and for teaching is by modelling good teaching. The study confirms the effectiveness of the methodology of self-study in the professional development of self and of interviewing one's students as a method for gathering data about one's teaching. Overall, I demonstrated in this thesis that self-study is a research approach that can be used to develop effective teaching through transforming into effective practical applications, the knowledge on teaching that lie abundantly and continues to accumulate in the literature.