ABSTRACT

A case study of a Soil Science teaching intervention for second year university students is presented here. The purpose was to address post-first year student underpreparedness for higher education. The curriculum was redesigned to iteratively develop students’ academic writing skills: with particular regard to environmental report writing, whilst imparting Soil Science content. To this end, students had to integrate practical and theoretical learnings into a soil erosion modelling report. ‘Micro action research dialogues’ were used to drive the development and delivery of this scaffolded curriculum. Both the process of curriculum development, and the curriculum itself, are detailed here. Recommendations were arrived at by the means of action research reflection: primarily, academics should engage formally with education as a discipline if curricula are to be successfully redesigned. Secondary recommendations are: a deep approach to learning requires a less dense curriculum; tutors need to be more formally capacitated; and administrative hurdles should not be underestimated.
INTRODUCTION

Soil Science is an important and topical discipline with 2015 being declared the United Nation’s ‘Year of Soil’ (Keesstra et al., 2016). Soil is a non-renewable resource, with 1 cm taking 1 000 to 10 000 years to form, and yet 98% of humanity’s food stuffs are dependent thereon (Wakatsuki & Rasyidin, 1992; Vitousek, Mooney, Lubchenco, Melillo, 1997). Despite this, some 66% of arable soil worldwide is classified as degraded mostly due to human activities (Vitousek et al., 1997). Knowledge of Soil Science is therefore a pressing need (Keesstra et al., 2016). Soil Science in fact consists of two sub-disciplines: Pedology and Edaphology. Pedology deals with the chemical and physical properties of soils, *in situ* soil formation and classification; while Edaphology is primarily concerned with how soils affect plants (Bockheim, Gennadiyev, Hammer & Tandarich, 2005). Nevertheless the terms Soil Science and Pedology are often used interchangeably (Shaw, 1930). Within this context a second year Soil Science module was offered at a South African university.

The module was developed using two main approaches: that of community of practice and that of action research. To meet the needs of the post-first year student, the module described here was designed using best-practice teaching principles with a strong focus on curriculum structure. In particular, the aims and objectives went beyond standard ‘soil science’ knowledge outcomes, to embrace explicit academic development outcomes, such as academic writing and team work. As the literature is surprisingly silent on the need to assist post-first year students achieve academic success, the intervention contributes to the literature on epistemological access and underprepared students for second year university (Topping, 1996; Dochy, Segers & Sluijsmans, 1999; Struyven, Dochy, & Janssens, 2003). The class of ~145 students were diverse in terms of: race, socio-economic status, gender and the degrees for which they were registered (science, humanities and education). That said, the majority were black, male, roughly 20½ years of age, South African, came from Gauteng and matriculated at rural or township schools that had relatively good matriculation pass rates. In the literature such students are regarded as ‘underprepared’ for tertiary study due to the generally poor quality of secondary schooling (Jacobs, 2007; Chokwe, 2013; Pineteh, 2014; McKay, 2016). Epistemological support to post-first year students is essential to address the systemic throughput and dropout challenges which universities face.

The curriculum was developed using action research, in particular micro action research dialogues. Micro action research dialogues are a series of critical conversations that drive the larger action research project forward. In this instance these dialogues took place between mentor and mentee. Thus, the authors were participants in the intervention: the lead author as the lecturer-researcher and mentee, and the secondary author as the mentor. This chapter was written as part of the reflective facet of the action research and also comprised an iterative process between the mentor and mentee. The chapter firstly presents the theoretical framework which underpinned the intervention. The personal teaching philosophy is then briefly described. The methodology is then outlined and the intervention described in depth. The chapter concludes with reflections and recommendations for the next action research cycle.

LITERATURE REVIEW

The Theoretical Framework: Community of Practice

The study was informed by the community of practice theoretical framework (Grant, 2005; Davids, 2014). Within this framework, insiders (the lecturers, tutors) of the discipline work with newcomers (the
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