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From Helicopter to Lighthouse: The experiences of a lecturer in equipping first year university physics students to move away from 'answer making' towards 'sense making'

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As the South African universities become more inclusive and the number of students entering increases, the range of backgrounds of these students is also broadening. The physics departments have noticed that students are 'not well prepared' for university studies (SAIP & CHE, 2013). The physics departments realised that while there are many people engaged in trying to improve the school system, things will not change anytime soon and that we must commit to teaching the students 'we have and not the ones we wish we had'. This paper explores the experiences of an undergraduate physics lecturer as she tries to equip students who enter university as 'answer makers' to move towards leaving as 'sense makers'. While the lecturer concerned is speaking about her experiences with reference to lecturing first year university physics, the pedagogical approach employed and the underlying teaching philosophy transfer easily to high school physics.

This approach is built on Vygotsky's concept of the zone of proximal development complemented with Bruner's concept of scaffolding. In addition, we acknowledge the importance of the theories of epistomological access (Boughey, 2005) to increasing the success of students at university in general and at physics in particular. We try to do this by enabling students to think about their learning in a metacognitive way by being explicit not only about the content of the curriculum but also about the learning actions that we expect from them and the cross-curricular skills that we are trying to help them to develop (Ellery, 2016).

The challenge faced by the lecturer in these case studies is to engineer the learning environment so that sense-making is encouraged over answer-making. We desire students to realise early on that many of the learning methods which they are used to employing need to be changed. As lecturers we realise that we cannot just expect students to realise this on their own but that we need to scaffold the process so that students do not become discouraged by repeated failure (Scott, 2009). If we are serious about "equal access for all" then we as educators need to seriously consider our pedagogy so that there is also an equal chance of success for all without compromising our exit standards.

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