

Transforming Tertiary Science Education: Improving learning during lectures

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Science education research shows that a traditional, stand-and-deliver lecture format is less effective than teaching strategies that are learner-centred and that promote active engagement. The Carl Wieman Science Education Initiative (CWSEI), a multi-million dollar project run at the University of British Columbia in Canada led by Nobel laureate Carl Wieman, has used this research to develop resources to improve learning in university science courses. We report on a successful adaptation and implementation of CWSEI in the New Zealand university context. This two-year project at Massey University and the University of Canterbury used perception and concept surveys before and after undergraduate science courses to measure students' attitudes towards science as well as their knowledge. The research team used these data, complemented with classroom observations of student engagement and student focus group interviews, to work with lecturers to create interventions to enhance student engagement and learning in those courses. Results show several positive changes related to these interventions and they suggest several recommendations for lecturers and course coordinators. The recommendations include:

- 1 Make learning outcomes clear, both for the lecturer and the students; this helps to cull extraneous material and scaffold student learning.
- 2 Use interactive activities to improve engagement, develop deeper levels of thinking, and improve learning.
- 3 Intentionally foster “expert-like thinking” amongst students in the first few semesters of the degree programme.
- 4 Be flexible because one size does not fit all and contextual events, are beyond anyone's control.