Foundations for modelling long-term learning and progression in higher education
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PROBLEM
University degrees aim to teach generic transferrable skills as well as fine-grained discipline specific knowledge. Students must acquire these skills and knowledge in a progressive sequence over the 24 or more subjects of a typical three to five year degree program. Students, lecturers, program coordinators, curriculum reviewers and employers must all be able to have a shared understanding of exactly what is being taught, how it is assessed, how much of it is being learnt and at what level of mastery.

APPROACH
We aim to create shared ontologies of the learning goals and mastery levels to model long-term learning progression across a degree. We use these ontologies to systematically track the teaching, learning and assessment activities across subjects. The approach is founded on curriculum mapping and learner modeling theories.

CONTRIBUTION: SCALABLE HIGH-LEVEL SKILL ONTOLOGY
We implemented and deployed CUSP (Course and Unit of Study Portal), which is currently used at the University of Sydney to map graduate attributes and discipline competencies across 200+ degrees and 2000+ units of study. CUSP provides live big-picture visualizations and reports in terms of the teaching and assessment of diverse learning standards.

CONTRIBUTION: EXPECTED VS. DEMONSTRATED LEARNING
We constructed fine-grained stereotype and actual learner models to map the fine-grained discipline specific knowledge that is assessed across multiple subjects of a degree. This enables educators to design assessments in terms of minimal expectations (bare-passing students) as well as aspirational expectations (top-performing students). Educators can visualize, share and reflect on these stereotype models to ensure effective learning design. Additionally, the implementation allows importing of fine-grained itemized student assessment marks to construct detailed actual learner models which can be visualized from multiple perspectives, allowing educators to fine-tune assessment and learning activities.

CONTRIBUTION: SHARED UNDERSTANDING OF MASTERY
To effectively model progression of fine-grained skills across the curriculum, educators must have a shared and comparable understanding of mastery and difficulty levels. We developed a web-based interactive tutorial system (http://progoss.com) utilizing self-reflection and meta-cognition to effectively train educators into using Bloom’s Taxonomy, Neo-Piagetian Development Theory or other generic classification schemes to consistently code the difficulty of assessment questions.

FURTHER DETAILS
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Publications:
• http://goo.gl/0Su0l
Demo Site:
• http://progoss.com