

Learning as accessing a disciplinary discourse:

implications for the design of an extended curriculum programme (ECP) in Physics

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Physics ECP background

- 1st year Physics over 2 years
- Foundational provision infused
- Mainstreamed – a team of lecturers in Physics Dept
- AD practitioner as part of the team

Cognitivist vs.sociocultural perspectives on learning

- **Cognitivist perspectives**
 - 'mental models', 'misconceptions', 'conceptual change'
- **Sociocultural perspectives:**
 - Learning
 - is not merely a **cognitive** process of acquiring **knowledge and skills**
 - but a process of accessing a **disciplinary discourse** through **participation** in a discourse community
 - thereby acquiring a particular **identity** (cf. Gee, 2001; Brown et al, 2005)
 - Participation in communities of practice is key
 - (cf. Lave and Wenger, 1991)
 - Situated learning and authentic activities
 - (Brown et al, 1989)

Gee's Discourse

- The particular ways of 'behaving, interacting, valuing, thinking, believing, speaking, and ... reading and writing' which characterise a particular community
- NB: not just reading and writing ("little d discourse")
- Little d discourse features often reflect the big D Discourse features of science

Gee, 1990; 2001

Making the discourse explicit

- Role of AD practitioner (Jacobs, 2005; 2007)
 - 'insider' vs. 'outsider' to the discourse
- Developing students' abilities to:
 - access physics texts
 - write scientific reports
 - develop experimental skills
- Nature of science
 - 'ways of valuing, thinking, believing etc'
- 'Thinking like a physicist':
 - physics as modelling – 'concepts first' approach
 - multiple representations approach (van Heuvelen, 1991)
 - the verbal, pictorial, physical, graphical and mathematical representations that comprise the disciplinary discourse of physics

Participation in the authentic social practices of the discipline

- Authentic inquiry-based investigations vs. recipe-like practicals
- Exposure to physics community: WOW sessions, dept seminars, visits
- Optional participation in Undergraduate Research Group activities
- PBL module in term 4 of Year 2

Participation in classroom community



Participation in classroom community

- To foster taking on the discourse of physics, talking and discussing physics is crucial
- Interactive, workshop-style lectures vs. traditional passive format
- Lecturer + TAs in each class
- Co-operative learning groups
- Maximising diversity in group formation

SCALE-UP project: Student-Centered Activities for Large Enrollment Undergraduate Programs



Future challenges

- Integration with mainstream 2nd years in 2009
 - preliminary indications show that the ECP students are well-prepared (eg. common class tests, Force Concept Inventory)
- 'Ripple effect' on curriculum reform in senior years?
- Managing diversity

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