WORKSHOP

AAEE 2012 CONFERENCE
Melbourne, Australia
www.aaee.com.au/conferences/2012/

Applying a sustainability framework to engineering design courses

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OVERVIEW OF THE WORKSHOP

Surveys of employers continue to show gaps between employer expectations and graduate professional attributes (Spinks et al 2006). Studies consistently show that undergraduate knowledge of sustainable development (SD) is very low, particularly on social issues (Nicolaou & Conlan 2012, Jollands et al 2012), although there is no consensus on why. Many authors recommend problem based learning as the most suitable pedagogy for developing generic skills (Mills and Treagust 2003, Litzinger et al 2011). RMIT has implemented a new way of teaching sustainability design courses in chemical engineering. A sophisticated industry approach to the identification of key performance indicators and metrics – called The Metrics NavigatorTM (GEMI, 2007) - has been introduced to assist students undertake a more systematic, rigorous evaluation of sustainability issues. The best design is chosen by comparing alternatives against criteria derived from stakeholder values and feedback. This workshop will introduce participants to the The Global Environmental Management Initiative (GEMI) approach (GEMI 2007), then apply some of the tools to a case study. We will also present a tool to evaluate learning in SD.

ACTIVITIES

The workshop will consist of the following activities:

- Introduction to a typical PBL project for chemical engineering students.
- A brief overview of GEMI's The Metrics Navigator^{TM}
- Work in small groups to map the SD aspects of the project (Concept map approach).
- Review worked examples (GEMI worksheets 1a, 1b, 2a, 2b)
- Participate in a stakeholder meeting (data for input to Worksheet 3a)
- Work in small groups to rank selection criteria (pairwise comparison)
- Review worked examples (GEMI worksheets 3a, 3b, process selection risk worksheet, Concept Map)
- Conclusion

TARGET AUDIENCE

Staff who teach SD but have not undertaken an evaluation of the effectiveness of student learning in SD; staff who would like to embed SD learning in their courses more effectively; staff who would like to learn how to teach SD in their courses.
Assumed knowledge:

- Experience teaching with or knowledge of problem based learning
- No knowledge of chemical process engineering is required

OUTCOMES

At the end of this workshop the participant will be able to:

- Integrate sustainable development principles into a student project
- Understand how sustainability metrics can be identified from stakeholder input
- Apply a sustainable development approach to selection of best process design in a given context
- Access a range of SD teaching resources.

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KEYWORDS
Engineering design, sustainability, metrics.

PRESENTERS BACKGROUNDS
Assoc. Prof. Margaret Jollands is Discipline Head, Chemical Engineering at RMIT University. Her research interests include polymer nanocomposites, as well as education research on topics such as interactions in large classes, sustainability and problem based learning.

Mr Mark Latham is Principal of Latham Solutions. He has is a consultant specialising in strategic risk management as applied to process industries, infrastructure and property portfolios. He has 35 years experience since graduating as a chemical engineer and has blended that experience with disciplines of business administration for over 20 years. His industrial and consulting experience has been gained with ICI, Orica, Shell, Origin Energy, Golder Associates and DuPont Sustainable Solutions – working in engineering design, operations, project management, technical and risk management roles spanning the full life cycle of process industry operating assets and products as well as working in organizational change.