Proceedings of the Second Biennial Conference of the South African Society for Engineering Education

11 – 12 June 2013

Vineyard Hotel
Cape Town, South Africa

Edited by Brandon Collier-Reed
Message from the President of SASEE

It is my great pleasure to welcome you to the second biennial conference of the South African Society for Engineering Education (SASEE). SASEE was formally launched at its first conference held in 2011, and the two years have rolled around in a busy way. Two workshops were held in 2012, to keep the momentum going – one on curriculum and another on teaching large classes. We have been delighted at the attendance and engagement so far at SASEE events, and the emergence of this dynamic community.

We have had a very good response to our call for papers for this conference and we have an interesting three day programme lined up. This year we headlined our call with the theme of “Teaching professionals / Professional teaching: towards an ethical, efficient and engaged engineering education” and we look forward to discussions that respond to this challenge. We are aiming a focus towards the building of professionalism in engineering education, interrogating not only efficiency (the current focus on throughput) but also the ethical basis for our teaching and the need for engagement.

The stunning Vineyard Hotel will form the backdrop for our deliberations. We particularly welcome all out of town guests to Cape Town! We are hoping for critical engagement with the current challenges we face in engineering education as well as the presentation of innovative work that is designing and trialling new ways forward. The SASEE conference is an important coming together of both research and practice-based scholarly work, covering topics at all the levels of policy, curriculum, and teaching and learning.

We are particularly grateful to our sponsors who have assisted in making this event happen. ECSA (The Engineering Council of South Africa) has played an on-going role in supporting SASEE at so many levels and we are also delighted that this year they have sponsored the Welcome Reception. We are pleased to welcome a new sponsor in FNB Platinum who made a generous contribution. Finally, we would also like to thank our exhibitors, Oxford University Press and Juta, for their participation in this event.

Prof Jenni Case  
President, SASEE
Conference Review Procedure

These proceedings are a published record of the Second Biennial Conference of the South African Society for Engineering Education (SASEE). The purpose of these proceedings is to disseminate original research and new developments within the discipline of Engineering Education.

All papers and extended abstracts accepted for this conference went through a multiple-review process prior to publication. Authors initially submitted extended abstracts which were double-blind reviewed by at least one member of the SASEE or Centre for Research in Engineering Education Executive. Based on the outcome of this review, authors were invited to either develop this extended abstract into a full paper, or were invited to revise their extended abstracts based on the reviewers comments for resubmission. The resultant papers and extended abstracts were then further reviewed by at least two reviewers using a double-blind peer review process. Authors were required to consider and implement the suggested changes where required.

The reviewers for the papers and extended abstracts were drawn from the SASEE Executive, SASEE membership, and the Centre for Research in Engineering Education (CREE) as appropriate.

The rejection rate for full papers was 14% and for extended abstracts was 13%.

SASEE Biennial Conference Organising Committee, 2013

Prof Jenni Case UCT)

Dr Debby Blaine (US)

Dr Keith Jacobs (UNISA)

A/Prof Brandon Collier-Reed (UCT)
Table of Contents

Full Papers

1 Plagiarism as an Expression of Agency
   Ken Barris .......................... 1

2 Using case studies to promote meaningful engagement in complementary studies for Engineering students
   Herbert Wolfgang Bernhardt ...... 9

3 Introduction to Engineering: an investigation into the first year experience in an electrical engineering course
   Anita Campbell, Reneé Smit ...... 22

4 Thinking and practising curriculum: A new first year course in chemical engineering at UCT
   Jennifer M. Case, Harro von Blottnitz, Duncan M. Fraser, Hilton Heydenrych, Jochen Petersen 29

5 Observations and conclusions of dynamics students’ mathematical fluency
   Tracy Craig, Trevor Cloete ....... 39

6 Do engineering educators teach the way they were taught? Engagement of engineering academics with teaching development opportunities
   Jeff Jawitz ......................... 48

7 Programmes for developing soft skills in Engineering students
   Clive Knobbs, Erna W Gerryts and Diederick Roodt 56

8 Creating a disposition for critical thinking in the mathematics classroom
   Christo Kriel ....................... 67

9 A case study on the challenges faced in the facilitation of a first year subject at a university of technology and how they can be overcome using reflective practices
   Rengith Baby Kuriakose ........... 76

10 Blacks, historical disadvantage, and engineering education:
    Lessons learned from the United States of America
    Cheryl Leggon, John Leonard, Sybrina Atwaters, Cheryl Leggon, Willie Pearson, Jr., Michael Gaines 85

11 The strategic position of the architecture programme within the Faculty of Engineering and the Built Environment at DUT: towards interdisciplinary engagement bridging the gaps between theory and practice.
   Yashaen Luckan ................. 105

13 The academic benefit of experiential learning for Civil Engineering students on the Pietermaritzburg campus of the Durban University of Technology Tom McKune 128

14 The effect of problem based learning on the attitude, motivation and reflection of students Martin Podges, Piet Kommers 138

15 A survey of past participants on the value of the Global Engineering Teams program in the modern workplace Cornie Scheffer, J. Cockcroft, M. Eisenberg 151

16 Teaching and assessing group work in Machine Design Kristiaan Schreve 158

17 Civil Engineering work as social semiotic work: A theoretical view of teaching and learning Zach Simpson 166

18 An investigation into the link between first-and second-year Engineering Mechanics courses. Bevan Smith 177

19 A case study in the use of teaming to improve engineering education in large classes Dan Turner 191

20 The development of a cooperative teaching-learning strategy for engineering thermodynamics Willem van Nickerk, Elsa Mentz 198

21 Growing engineers: The experiences and reflections of a bursary provider Marietjie Vosloo, Murray Hofmeyr, Nadine van Westrhenen 208

22 Engineering Design, why is it so difficult to teach and to learn? Nicky Wolmarans 219

23 Transitional distance: A new perspective for conceptualizing student difficulties in the transition from secondary to tertiary education Laurie Woollacott, Dawn Snell, and Sumaya Laher 229

24 Variation in the mastering-practices of first-year, South African engineering students: A phenomenographic study Shirley Booth, Laurie Woollacott, and Ann Cameron 240
Extended Abstracts

25 Teaching project management to undergraduate engineering students
Andre Burger, C.S.L. Schutte 294

26 Google maps - A visual introduction to the Cumulative Effects of Development for Civil Engineering students
Daryl de Kock 296

27 The effect of the Numberwise program on first year students’ academic performances at an University of Technology
Lidamari de Villiers 297

28 Flipping the classroom: Students’ and lecturer’s perceptions on the use of the inverted classroom method of curriculum delivery in a hydrology course
Eunice Ivala, Anton Thiart, Daniela Gachago 300

29 An investigation into causes of poor performance in a final level course in Mechanical Engineering
Bruce Graham, Mark Walker 302

30 Using the Dynamics Concept Inventory to assess teaching effectiveness
Helen M. Inglis, Carl Sandrock 304

31 Effectively spreading the Engenius Message: “Join the Engineering Team that makes our future happen!”
Liesel Kirsten 307

32 Sustainability, citizenship and ethics within the mainstream engineering curriculum?
Genevieve Langdon 310

33 Writing laboratory reports in a Mechanical Engineering course at a comprehensive university: Knowledges, practices, beliefs and experiences of first-year National Diploma students
Hannalie Lombard, Anne Knott 313

34 Industrial Partners' stance on Work Integrated Learning (WIL) informing transformation towards New Engineering Curricula at NMMU
Pat McGrath, Hannalie Lombard, A Lourens, Vincent Danoher, A Roberts, F Grebe 315

35 Mind maps as a teaching tool: Its relationship to learning approaches, materials science self-efficacy, and academic achievement
Ruric Vogel, Salomé Human-Vogel 317

36 Using NSC results for placement in programs: correlation between NSC Maths, Physics and the 1st year courses Mechanics I and Mathematics I results in Mechanical Engineering at Durban University of Technology
Mark Walker & Bruce Graham 319