Do engineering educators teach the way they were taught? Engagement of engineering academics with teaching development opportunities

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In 2012 permanent academic staff at seven higher education institutions in South Africa, were surveyed about their engagement with professional development opportunities in teaching as part of a national study. This article presents an analysis of data from 62 respondents in the four institutions with engineering faculties. The study explored the presence of contextual aspects related to their engagement with opportunities for development in their role as engineering educators. The survey collected qualitative data in response to a set of statements probing enabling and constraining conditions at institutional level in relation to these opportunities. The qualitative data surfaced information about respondent ambivalence in their replies to some survey items.

The majority of engineering respondents (84%) had participated in professional learning opportunities to develop their teaching and provided a positive picture of the factors enabling these opportunities within their contexts. Most felt that significant resources were available for professional development in teaching; that there was easy access to information about such activities and that the majority of topics and content was applicable to the discipline of engineering.

Respondents were divided as to whether institutions provided formal recognition for engagement with these learning opportunities. Despite citing inclusion of related criteria in performance appraisal procedures, some responses revealed cynicism as to whether these criteria were taken seriously. Heavy workload was cited as a significant hindrance to participating in these opportunities.

In only a limited number of cases did respondents reveal either structural or cultural elements that directly related to the discipline of engineering.

Introduction

There is a growing emphasis on the professional development of university teachers in South Africa, particularly given the increasingly complex context within which we work at the disciplinary, institutional and national level. (Scott, Yeld & Hendry 2007, HESA 2011).

In 2012 a questionnaire was sent to permanent academic staff at seven higher education institutions in South Africa as part of a NRF study into the professional development of academics in their role as teachers. The aim of the survey was to identify practices and beliefs around professional learning opportunities in teaching, to explore the level of participation in such opportunities, and to understand the enabling and constraining conditions that respondents experience around their engagement with such opportunities. The theoretical framework that informs this project draws on the work of Archer (1995) and explores the interplay between structure, culture and agency. Given the multi-institutional nature of this project it is recognized that an understanding of context both at an institutional level and at a disciplinary level is crucial. The questionnaire and the data it has generated has been treated as a "discursive 'event' … being simultaneously, a piece of text, an instance of discursive practice, and an instance of social practice" (Fairclough 1992, 4). The text was chosen to explore the possibilities that the survey questionnaire data might offer for surfacing issues of structure,

culture and agency specifically in relation to opportunities to learn about teaching in the engineering discipline.

The survey of academics

The larger project that this study forms part of has collected data through institutional reports, interviews and a web-based survey. The survey consisted of 27 questions divided into five sections: Biographical details; Teaching Experience; Professional learning; Enabling and Constraining factors, and General feedback. It included opportunities for short qualitative responses in the last two sections.

The questionnaire asked respondents how often they attend professional development opportunities, where they seek help about teaching, if at all, and in relation to which aspects of their teaching. Data on institutional culture was collected through questions relating to formal recognition of participation in professional development opportunities in teaching; the availability of resources to support such engagement; whether the topics offered were applicable to their discipline and the accessibility of information about the available opportunities. Finally data was collected around the significance of workload on this participation.

This study revealed significant limitations of working with survey data across multiple institutions where the control over the distribution and administration varies significantly from one site to another. Challenges were experienced in the administration of the questionnaire related to shortcomings in the technology used for capturing the web based entries and a lack of control over the way in which academic staff were approached to participate. The intention to invite only permanent academic staff could not be strictly implemented as several of the participating institutions did not have mechanisms that would ensure this targeted distribution. As a result the research team was unable to ensure a consistent data collection strategy across all sites.

In total, 513 valid responses were received from the four participating institutions offering engineering qualifications. Sixty-two respondents were identified as engineering educators (Table 1). The sample is dominated by two historically advantaged institutions with strong research profiles (SU and UCT) with only a small number of respondents from two Universities of Technology (UoT). As a result only a limited element of institutional difference can be inferred from the data. However this sample provides a valuable opportunity to try and understand the engagement of engineering academics with opportunities available for development in their role as teachers.

Table 1. Engineering academic sample

	CPUT	**DUT**	**SU**	**UCT**	**Total**
All respondents from institution	21	49	272	171	513
Engineering academic respondents	7	4	30	21	62

Cape Peninsula University of Technology (CPUT); Durban University of Technology (DUT); Stellenbosch University (SU); University of Cape Town (UCT)

White male academics formed the largest group (60%) of engineering respondents. While 69% of participants from the research intensive universities (UCT and SU) had completed a doctoral degree, only one of the eleven UoT respondents (9%) had done so. This difference is reflective

of the disparities found across all higher education institution types in South Africa in 2007 (ASSAf, 2010).

Fourteen respondents (23%), the majority from UCT, had some qualification in teaching. The eight UCT staff had completed either a postgraduate educational qualification such as a PhD (2), an M Phil, a PG certificate, or modules from a PG Diploma (2) and a short course (2). Four UoT respondents had Higher Diplomas or a B Ed. Only two SU respondents had a Diploma and a PG Diploma, while one CPUT respondent had completed a Higher Diploma in Higher Education and Training and commented that the "qualification is required by new academics" at CPUT.

Participation

The distribution of levels of participation of the engineering academic sample was almost identical to those of their non-engineering counterparts at the four institutions (Table 2).

Table 2: "How often" - participation in professional learning opportunities in teaching

	Frequently (1/term or 1/semester)	**Once a year or less**	**Never**	**Other**	**Total**
Engineering respondents	24 (39%)	27(44%)	10(16%)	1(2%)	62
Non-engineering respondents	157 (35%)	196 (43%)x	87 (19%)	11(2%)	451

The most frequent reasons cited for participation relate to the issue of time being available (41) as well as the perception by staff of what might be "helpful to teaching" (43), "relevant" (42), "of interest" (36) or "worthwhile" (35).

Most of the respondents (43), including 8 of the 10 who indicated that they have never participated in professional learning opportunities, approach colleagues for help or advice on teaching. Just over half use the internet and a third approach their head of Department (Table 3). The most frequent topics that they sought help with represent a generic set of concerns related to teaching in higher education with nothing specific to the engineering context. (Table 3)

Table 3: Seeking help with teaching

	Where do you go for help?	**What help do you ask for?**
Most frequently cited responses	Colleagues (43) Internet (33) Head of Dept (20) Teaching & Learning centre (18)	Curriculum (31) Engaging students/interactive teaching (31) Assessment (30) Large class teaching (29) Integration of technology in teaching (26)

Non participation

Ten of the respondents, white male academics from either SU (6) or UCT (4), indicated that they had never participated in professional development activities related to teaching. Two of these were new lecturers and two submitted incomplete surveys with the five qualitative questions unanswered.

Only two of the remaining 6 respondents referred to their engineering discipline in relation to their non-participation. In both cases they claimed that the emphasis in such activities did not relate to the particular needs of engineering educators. A 51 year old full professor at SU for 19 years felt that recognition of teaching "has very little effect". While there was funding available for teaching related projects "as an engineering lecturer" he could not use his postgraduate students to do the research so it was of no help. He felt that "teaching large classes, lots of admin and the overriding importance of research in performance culture means there is no time left". He went on to comment that "the volume of work … and our emphasis on understanding plus problem solutions are often not compatible with methods discussed in learning opportunities". A 55 year old senior lecturer with 25 years of experience at UCT indicated that there "seems to be disparity across the institution -even across departments within a faculty" in relation to recognition of teaching development. "Some departments appear to make arrangements by colleagues filling in if necessary, while others do not." Although information was easily available, he explained that "if I had more focus (manageable load) I perhaps would participate more". Despite indicating that he had never participated in teaching development opportunities he wrote that topics generally cross disciplines although there are many specific issues that are dealt with from a more humanities perspective and ignore the challenges of the more conceptual quantitative arenas.

The remaining non-participant respondents provided a range of reasons that appear to be unrelated to their engineering discipline. Two UCT respondents, a 61 year old professor with 21 years teaching experience and a 46 year old associate professor with 10 years teaching, indicated they had no need for help and the latter wrote that there was "no time for such activities". A 30 year old newly appointed senior lecturer at SU felt that while participation in teaching development opportunities "is mentioned on performance evaluation, people don't generally take it very seriously". He had "never really tried" to find out about workshops and courses on teaching.

> I am much more interested in doing research and contract work to supplement my, rather low, university salary than attending courses on teaching for days at a time where you do not really learn anything useful. If I am paid extra to do it I would.

A 67 year old senior lecturer employed for 29 years at SU who does not do formal teaching anymore, commented that it was "too late to change". He felt that "the primary problem is not the quality of teaching but the ability and commitment of the students coming into university." In his view "universities are learning institutions, not teaching institutions."

Enabling and constraining conditions

Five survey items probed respondents' perception of the institutional enabling and constraining conditions in relation to participation in professional learning opportunities for teaching (Table 4). Of particular interest was identifying any reference to the engineering discipline within the comments made in response to these questions. Five respondents failed to complete this part of the survey reducing the sample to 57. All five were relatively new appointees at their institutions. Three had spent one year and two had spent three years at their institutions. This might have influenced their decision not to complete this part of the survey.

Table 4. Statements probing enabling and constraining conditions

Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1. My institution provides formal recognition for engagement in professional learning for teaching.	2	18	23	8	5
2. My institution provides resources for engagement in professional learning for teaching.	11	35	6	2	3
3. My workload often hinders my ability to participate in professional learning for teaching.	25	23	6	1	1
4. The topics of the professional learning opportunities for teaching are often not applicable in my own discipline.	0	15	21	20	1
5. I can easily access information on professional learning opportunities for teaching in my institution.	7	35	10	5	0

Statement 1 explored to what extent respondents experienced a valuing of their engagement with professional learning through formal recognition of such engagement by the institution. Eighteen respondents "agreed", and 2 "strongly agreed" giving the impression that this was the majority experience. However a large number of respondents (23) indicated they were "not sure". Of these three indicated they were new academics, while several commented that they perceived a lack of recognition, or that the recognition had no effect.

> Recognition is given as one of about 30 items on our performance assessment, in other words it has very little effect (SU)
>
> It is mentioned on performance evaluation, but people don't generally take it very seriously (SU)
>
> I thought it did but in my recent ad hom I didn't see how my teaching development activities were rewarded. (UCT)
>
> In some ways it seems to, but not when it matters like promotion. (UCT)

A close analysis of the qualitative comments across all categories suggests that the sample is divided across all institutions as to whether or not formal recognition is given to engagement with professional development opportunities in teaching.

Only two respondents made specific reference to formal recognition in relation to the engineering discipline. One respondent who was "not sure" felt that while some other professions gave this recognition this was not the case "within my profession".

A respondent who "strongly disagreed" felt that institutions regard engagement with learning to teach as something "the teacher is doing for himself". The high workload also meant that

engineering lecturers were difficult to recruit because "industry is paying far better salaries compare to the teaching profession".

With the exception of the four DUT respondents there was a strong indication across the other institutions that resources are provided for engagement in professional learning for teaching (Statement 2). Only one respondent from UCT and none from SU disagreed with this statement. The UCT respondent commented that academics are "expected to take on more and more with less and less resources." Another at UCT felt that while "much is done to support teaching, however this is not evidenced in staff performance evaluation in the manner in which it could be."

The Centre for Teaching and Learning (CTL) at Stellenbosch and the Centre for Higher Education Development (CHED) at UCT were mentioned repeatedly as providing a "large number of wonderful courses", as well as "many layers of short briefings and workshops, short courses, formal courses and teaching qualifications, across a wide range of topics, all well organised and taught by experts, with fee subsidy and funding opportunities."

As expected, high workload was cited as a significant hindrance to participation by 84% of the respondents who agreed or strongly agreed with Statement 3. The dilemma of deciding how to spend ones time was well articulated by a respondent from SU.

> personally I am an academic because I love research and my profession, and this is what I want to focus on. I do enjoy teaching, but have very little time available to invest in professional learning for teaching - the opportunity cost in terms of research and management time is just too high.

A second colleague from US put it more bluntly

> It is impossible to balance lecturing 2 subjects (total 250 students) 10 post grad students, 5 final year projects, do your own research and provide consulting services to industry.

A third colleague at US referred to the pressure to increase the number of engineering student graduates and research outputs:

> Our undergraduate class numbers have exploded in engineering over the past years, with increased pressure to produce research outputs. We are expected to simply up the pace and make time (learning for teaching is then far down the list of priorities).

In relation to the content and focus of professional learning opportunities, the majority of respondents felt that "there are many topics relevant to any type of teaching." A cluster of respondents argued that "learning for teaching seems to be independent of discipline" and that "most of the courses offered are applicable to all disciplines".

Only 26%, including the non-participation respondents quoted above, felt that the topics were not applicable to their discipline. In one of the few explicit references to a particular "culture" of engineering, a UCT respondent commented that

> Engineering has its own culture and context and a lot of the courses etc. out there are for small group work or require lots of resources and time to implement - something I don't have when teaching 240 students a maths heavy course.

Four respondents from US, displayed a strong sense of individual agency in that while acknowledging that topics were often not directly linked to the engineering discipline, they were able to "always find something interesting".

> There is always a chance that a presentation will be focusing on aspects not applicable to one's own discipline, but you can always take something out of it.

> I can decide for myself what opportunity is applicable and what not
>
> Courses are often discipline specific and that is good: I can choose what is relevant. The rest is obviously not applicable.

These respondents took responsibility for making the opportunity worthwhile and applying what they could to their discipline. A respondent from UCT supported this approach and commented that "I see … the finer application to my discipline is part of my own role in the process."

With respect to Statement 5, the majority of respondents (74%) felt that they had easy access to information on professional learning opportunities for teaching at their institutions. The active roles played by the CTL at SU and CHED at UCT in disseminating information were mentioned with many referring to frequent emails and links to related websites.

Looking for Structure and Culture

The structural aspects that are strongly evident in the qualitative survey data are the system of performance appraisal and the existence of institutional centres of teaching and learning. While centres were clearly presented as playing a positive role in enabling professional development opportunities there was an ambivalent message as to the role of the performance appraisal system. While on the one hand it was cited as providing formal recognition at the institutional level for teaching and teaching development, on the other it was accused of not taking teaching seriously and favouring research and research development.

The cultural aspects revealed within the data clearly argue that teaching is not priority for many academics and that participation in professional learning opportunities is hampered by the demand for research, administrative duties and heavy teaching loads.

As is clear from what has been presented above there was very little evidence of the engineering discipline in the data. This absence of discipline in the comments of the majority of respondents presents a significant challenge to educational researchers who use survey techniques as part of trying to understand the impact of context.

Only eleven respondents, including five from SU and three from UCT, have made any reference to their engineering discipline in their comments. It may be that cross-disciplinary and multi-institutional surveys of this kind generate responses that supress aspects of context. It may also be that the questionnaire instrument itself did not sufficiently foreground the discipline in the framing of its questions.

The dominant discourse with respect to learning to teach is that it is a generic activity and most of the respondents argued that they expect courses to deal with general topics and not be too discipline specific. Several argue that the responsibility to do the translation into the disciplinary context lies with the academic.

Conclusion

The dominant discourse from the sample of engineering respondents is one that values teaching and support for teaching. This outcome might only reflect the interests of those who choose to complete surveys of this kind. Most of the engineering educators who responded appear to appreciate generic teaching workshops that they can apply to their context.

On the surface it would appear to be extremely important to understand contextual factors that might impact on the engagement of academics with professional learning opportunities on teaching. The survey data analysed has been disappointing in its opaqueness with regard to discipline and institutional difference.

A minority view amongst the sample was expressed by two white male lecturers at SU in their late fifties who only joined academic life about 10 years ago. As individuals who have joined academic life late in life, they are possibly able to comment on some of the cultural aspects they observe in ways that are less invested than their colleagues.

> Very few university teaching staff feel that they are incompetent and therefore feel a need for continuing education. Even the worst ones feel that they are doing good work by keeping standards high and preventing inferior individuals entering their professions. … Nobody has anything against teaching development. It just loses the race against the others for the teaching staff member's time.
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> The opportunities to learn and the support if required are available for the asking. Engineers, however, tend to work in their technical silos and assume the way they teach, which is formed by the way they were taught, is sufficient.

The sample of engineering educators reflected in this study appear to have a different attitude towards improving themselves as teachers. It is worth speculating however whether these comments reflect the views of a far larger proportion of engineering educators than is suggested by this survey.

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