"I had this real feeling that it was a boys club"

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Abstract: *The engineering profession continues to experience difficulty attracting and retaining women. Gender equity programs that focus on women's training, socialisation and non-traditional 'choices' overlook the centrality of workplace cultures. This study reframes the issue, problematising the work context, rather than women themselves. A qualitative investigation of women's and men's experiences in a range of engineering disciplines, industry sectors and work locations has been conducted. This investigation found that women engineers do not leave the engineering profession primarily as a result of family responsibilities, or their lack of confidence, technical expertise, or interest in engineering work compared to men. Rather, a more significant contributor to their reasons for leaving the profession was a feeling of alienation within the prevailing workplace culture.*

Keywords*: women in engineering, workplace culture, equal employment opportunity*

Introduction

Workplaces are changing rapidly in restructuring economies, but equity and diversity remain elusive. Despite several decades of Equal Employment Opportunities policies in engineering, women continue to be under-represented compared to men as engineering students, faculty members and professionals. Engineering has the lowest female share of any broad field of study in Australian universities, and the rate of increase in the enrolments of women in engineering courses has remained at around 0.3 or 0.4% per year from 1994 to 2000 (Kryger

and Agnew 2002:39). The proportions of female engineers are not increasing as rapidly as women within other male dominated professions, and there is a clear tendency for young women to drop out of the profession (Bureau of Labour Market Research 1985:1x; Lewis, Harris and Cox 2000:6-7; Roberts and Ayre 2001). Women at all ages leave the profession at a steady rate, while men are more likely to stay in the profession until retirement (Australian Bureau of Statistics data in Ayre 2001:8).

In 2000 the Women in Engineering Committee of the Institution of Engineers, Australia (IE Aust) instituted a research project entitled the Careers Review of Engineering Women (CREW). The outcomes of the project have been reported by Roberts and Ayre (2001). The project involved a nation wide survey of all of the female members of the IEAust (along with a matched sub sample of male members) with 767 female engineers (42.2%) responding to the initial survey. This led to the establishment of a database with an array of quantitative data identifying where the women were working, the period of employment, type of engineering work, salaries, workplace satisfaction levels and years since graduation. All of these indices were compared with those from the male engineer respondents. The database showed that women engineers are significantly more dissatisfied than their male counterparts with the prevailing conditions and attitudes in their workplaces. Women identify negative perceptions of their suitability, and lack of equitable staff development, promotion, communications and rates of pay as critical to their frustrations (Roberts and Ayre 2001:5). In addition, 36% of the female respondents reported that they had experienced discrimination on the basis of gender. This evidence suggests that workplace culture is significant to women's participation in engineering.

The quality of these experiences, the ways in which workplace conditions impact on life choices, the effects of size of an employer and 'critical mass' in terms of numbers of female professionals are unavailable from the figures alone. There is a need for more qualitative data if the research is to lead to a developed understanding of workplace culture and, more pointedly, to the reasons behind the high female attrition rate. This paper reports on a subsequent project that has adopted a qualitative approach in which female and male engineers were interviewed about their work experiences.

Previous approaches

Traditional approaches to equal employment opportunity (EEO) policies targets women as the source of the problem, identifying their apparent unwillingness to make non-traditional choices, or because their domestic obligations mean they require 'special assistance'. (Bacchi 1999). EEO initiatives have clearly benefited women and other marginalised groups, but, as Bacchi observes, their beneficial effects come at the cost of requiring conformity to existing norms of workplace behaviour.

With regard to engineering, such approaches focus on its failure to attract women at secondary school level (Bureau of Labour Market Research 1985:15; Jawitz, Case and Tshabalala 2000), the need to improve women's confidence and success in preparing for engineering courses or engineering professional practice (Ayre and Beynon 1988; Maskell-Pretz 1997:34) and the influence of women's childhood socialisation on their acquisition of technical skills (Hacker 149-50:1989; McIlwee and Robinson 1992). Much of the relevant literature emphasises attitudinal barriers that operate beyond the workplace and which prevent women from gaining entry to, and succeeding within engineering (Bielski 1989; Bureau of Labour Market Research 1985:15; Maskell-Pretz and Hopkins 1997). Women are

sometimes assumed to lack expertise, confidence and significant exposure to technology (see for example Cockburn and Ormrod 1993; McIlwee and Robinson 1992). Yet, women engineers who participated in the interviews in this study often expressed a childhood fascination for, and an expert facility with, engineering technologies. Other researchers have highlighted women's contributions to technological developments throughout history (Clarson 2000; Oldenziel 1999; Stepulevage 2001). These authors suggest that the view that women are technologically lacking is itself a contested product of gendered struggles over the meaning of technology; struggles in which women have been historically less successful in their claims than men. In short, it is not that men are 'objectively' more technically minded, but that the work that men do, and masculinity itself, is read through a cultural lens that invests them with 'technological' significance. Engineering, as an occupation strongly associated with technology, is then gendered as masculine.

Those explanations that focus directly on women in the profession may, unintentionally, support equity and access programs that aim to increase women's entry into engineering by targeting women themselves, without problematising or changing the way engineering is taught and practised (Rosser 1998:175, 177). In these approaches engineering is maintained as value neutral with the implication that, once barriers and discrimination preventing or obstructing women's participation have been removed, they will be free to compete on equal terms with men. This study found that although providing equity programs and alternative support structures will be of benefit, such strategies often receive a hostile reception from many female engineers who view such initiatives as undermining their professional credibility. In addition, this research suggests that women engineers in Australia are often highly critical of an approach that effectively delegates responsibility for change to isolated, and sometimes embattled individuals who are attempting to balance high workloads, family responsibilities, and the personal and professional costs and demands arising from being female in a male-defined culture. Our study argues that change strategies must be directed at the organisational culture in which women engineers are located.

The study

The project commenced in 2002 and involved the conduct of interviews with engineers from regional, remote and metropolitan centres of Victoria, Queensland, South Australia, Western Australia and the Northern Territory. Fifty-one semi-structured interviews were conducted with 41 women and 10 men engineers, and a further 4 interviews were completed with women engineers via email. The sample group was drawn from people who had indicated on the original CREW survey that they were willing to participate in follow-up interviews and from additional contacts supplied by various state-based Women in Engineering groups. The sample was generally representative of the spread of Australian women engineers in terms of age, career progression, employment type, geography and engineering field. Those interviewed included civil, structural, electrical, metallurgical, mechanical, aeronautical, chemical, and environmental engineers at a range of ages and career stages in companies, consultancies, and government agencies.

All interviews were conducted by the first author, enabling a consistent approach in the conduct of the interviews and the eliciting of additional information as themes began to develop in participants' responses beyond the basic interview questions. Participants were asked to summarise their work history and current work, along with questions about why they chose to do engineering, what they thought it means to be a "good engineer", whether they ever felt uncomfortable at work, what changes they felt had occurred in the engineering

profession, what they would change about their own experience if they could, why they think women engineers are leaving the profession and what changes they would make to facilitate women's career progression in engineering as well as some questions regarding their household and family arrangements and whether that resulted in any conflict or tension with their professional life. The analysis of the interview material focused upon how women engineers negotiate the cultural field, the meanings they bring that both subvert and cooperate with their cultural positioning as women or 'non-engineers', and the effects that these ways of thinking have upon them both personally and professionally, upon the organisations they work within, and upon the effects of engineering work. At the time of writing the analysis of the interviews is incomplete. The following discussion constitutes the major themes emerging from preliminary analysis.

Findings

Fitting in
Far from being uncomfortable with technology and lacking in assertiveness the interviews suggest that a number of women engineers are strongly masculine identified. For instance, the words these women used to describe themselves include: 'bullish', 'stubborn', 'determined', 'technical', 'you have to be tough', 'not the girly type', 'competitive', 'proactive', 'big picture focused', 'managerial'. They were also clear that their survival in engineering was due to them being unlike other women: 'a lot of the females that I meet I would not suggest it for them', 'there's no point getting more women in unless the environment changes, otherwise you're only going to get the odd one or two nutters like me that places a different emphasis'. These women expressed little or no difficulty getting along with men, did not feel discriminated against, were less likely to attribute their negative experiences to gender difference, were happy in the career and planned to stay in it. For these women, having established their technical competence, 'the whole female thing just disappears'.

These women tend to be far less critical of the culture of the engineering workplace, and of management and company objectives, and they assume that the work place culture is value neutral:

> I think anybody adapts to the culture, male or female, I don't think the workplace is biased to males, or that women would leave because they were finding pressure on them or they were being harassed, I think it's purely family decisions.

The point of view is very much that women, some women at least, are as good as men: 'if boys can do it, girls can do it'. Interestingly an insistence upon the lack of gender discrimination was often followed up by stories of negotiating pornography and sexual references to their bodies in the workplace, bosses who expected women to be more emotionally supportive in the workplace than men, clients who were unable to give a woman engineer credibility, university personnel who thought women belonged in the arts faculty, and so on.

Women who fit this pattern saw the main problem faced by women engineers and themselves as related to parenting, that is, that the engineering profession is not conducive to having children. This constituted the primary area of contradiction for their positioning of themselves as 'engineers'. The second area of identification with 'women' saw them positing women leaving the profession as a sign of women's advantage. They thought that women left the profession because 'women have all those other touchy, feely skills, communication skills

and the opportunity to go up ladders and move the career forward might lie outside of engineering'.

Feminine identified

A second, larger, group of women engineers were more feminine identified. Their values were often expressed in opposition to the main engineering culture, and this group was much more likely to move out of the profession. This group were more likely to emphasise the need for business ethics, environmental values, making a contribution to society, and the importance of feeling aligned with company values. This group also expressed a greater awareness of being treated differently, and this led to a greater sense of discomfort:

> I guess probably where I get discomfort from is the fact that they do treat you as a female, you are a female and they go out of their way to make sure that there's no swearing, they open doors, and it's quite nice, but it makes you aware that you're different, they're doing something, they're forcing themselves to do something that's out of the norm, they're treating you like you're the daughter or the wife, it highlights that you're definitely something different and not something that's normally encountered.

This group sometimes explained women leaving the profession in terms of boredom, or that women are more 'adventurous' and 'enjoy change'. They also emphasised the important role that the support they received in their work group, especially from other women, played in their sense of satisfaction. These young women expressed feelings of discomfort in an all male environment: 'the stares are quite discomforting'. They cited discrimination, preferential treatment toward men, and sexual harassment.

A lot of these women appear to be in grave danger of moving into the third major group identified in the interviews. In this group, for both men and women a sense of difference, alienation and desire for change becomes more clearly defined. These engineers become increasingly critical of the work environment, refuse to adapt, and end by leaving the profession.

Resisting the dominant norm

Of the men and women interviewed who had left engineering, most were clear that their decision to leave was not related to their level of interest or enjoyment in engineering work. Instead they pointed to the masculine work styles around them, their refusal or inability to conform to these, or the long-term exhaustion and sense of pointlessness that flowed from the effort expended. These engineers had highly developed critical perspectives regarding the work culture around them, which they saw as different from their own style in a variety of ways. They were also much more likely to be critical of the standard of work being performed around them, and the tendency for men to 'talk up' their work, and their abilities. The women in this group were not prepared to adopt either a masculine or a daughterly position, showed significant self-confidence in their own viewpoints and abilities, refused to accept a subordinate positioning at work, and attempted to introduce their own style into the engineering culture.

Some reported being openly punished for their refusal to adopt a more masculine work style:

> I don't fit in with the staff very well, and basically I'm new and different and they don't want me there.

Although they were happy with her work performance, this woman was actively encouraged by her bosses to adopt a more conformist behaviour style: 'harmonious is what they like, but basically you have to do what they say'. This involved getting 'a space between you and that

feeling', and 'putting up a shield against negativity and rejection' in order to 'not upset people', because it makes 'some men feel uncomfortable'.

Both men and women engineers in this group had criticisms related to, or were prepared to enter into conflict with others with regard to: a concern with the 'good of the community'; 'a sensible spending of money'; long term solutions; a lack of respect for the company, other workers, and women; and business ethics, expressed in terms of the obligations of managers to be truthful with clients about the company's performance.

One man expressed a concern with 'conservatism' in engineering, which he saw as 'a little bit dangerous and regressive because it doesn't allow individuality'. This man also saw the lack of company ethics as not only central to his own decision to leave the profession, but also of many women who are less concerned with being a breadwinner and projecting a confident aura:

> If all you get out of your workers is your money and a little bit of satisfaction out of the authority type power stuff then you can do that as a bloke engineer, you can get along alright, if you want any sort of equity, justice and ethical issues to be predominant, then engineering's going to be a difficult profession. …. We are now so much more aware of stuff, we know how much damage we're doing to the planet, we know what the impacts are, but the inertia, particularly in the engineering profession, makes it very hard to make the changes and do the things that most people know that they could do.

These engineers pointed to pressure and exhaustion from bearing the burden of bringing about change in the profession:

> I think people just don't stay in because you reach this point and you just realize that it's just not worth it, you stop hitting your head against the brick wall, it doesn't hurt anymore and you just realise that there's a point where there's, there are other things to do and you can do that. … I guess when you're young, I guess it's happened you know, every generation as a female you think you can make a difference, you can make a change, you want to get in there and change people's attitudes and do all that thing, but you reach a point where you're saying I think I've done my bit perhaps, I don't think it needs to be me anymore, you've done what you can do with the resources that you've got, I reach a point where I'm not prepared to put anymore of myself into it you know.

One woman also felt that her refusal to play down her femininity was a direct cause of the extreme sexual harassment that she experienced at work.

Discomfort in the workplace

When asked about discomfort experienced in the workplace, men's responses were quite different from women's. Men most often cited a particular example of a difficult working relationship, where women referred to gender specific difficulties. Only four of the 23 interviews analysed at the time of writing said they felt no general discomfort, or gender related issues at work, (although one also spoke about problems getting more junior men to accept her authority). The most commonly cited source of discomfort for the remaining group related to the 'boys club'. This included being overlooked for promotion and opportunities; being seen as about to 'go off to have babies' and 'not management material'; and preferential treatment of male engineers. The second most commonly cited form of discomfort for women was problems with more junior men not accepting women managers; followed by sexual harassment; pornography; and sexist, and homophobic 'jokes'. Least commonly cited forms of discomfort among women were competition from other women; clients not accepting women as engineers; being excluded from workgroup social occasions; lack of family friendly work culture; and problems with women administrators. Interestingly,

while the lack of family friendly policies are often cited as the main reasons women leave the profession, this was not a common cause of discomfort in the workplace. In fact women who had left, or who were thinking of leaving, did not emphasise the lack of family friendly work cultures in their own experiences.

What is overwhelmingly evident in the interviews in general is that women engineers do not complain directly about sexism, or the behaviour of the men around them. There was a tension in the interviews between on the one hand reports of difficulties and dissatisfaction, and on the other frequent claims that 'in general there's no problem'. There were also a number of comments suggesting that equality means sameness with men. To be taken as similar to men is a relief in a culture that will not tolerate or respect difference.

> In a lot of respects the fact that they've forgotten that you're even there or that you are different is a positive sign I think as well in that you're just being treated exactly the same as they would treat anybody else you know, so there's very few times that you feel standing out.

This kind of commentary provides clear evidence of the masculine gender of the profession. Women manage their behaviour in order to 'fit in', to avoid being noticed or attracting negative attention.

> I know I shouldn't make a big, I don't like to make a big issue of this because I did generally get on with the males, but you could never blend into the background, you were always the focus, like they were always waiting for you to stuff up because that was just fantastic … because they can give them a hard time, I mean you know what guys are like when they're together.

While the lack of workplace provisions for parents and overwork is clearly a problem that contributes to women leaving the profession, the problem is more complex than this. Although women's interviews were littered with examples of cultural pressure upon them as females, few explained 'women's' decisions to leave the profession in terms of their 'outsider' status. Most women and men continued to 'not notice' this pressure to use Tonso's (2001) words, a practice which only serves to reproduce women's status as aliens.

Results and conclusions

One of the most critical preliminary conclusions of the study is that the engineering workplace is intolerant of values and behaviours that diverge from dominant norms. Responses indicated that women engineers do not leave the engineering profession as a result of family responsibilities, or their lack of confidence, technical expertise, or interest in engineering work compared to men. While women were far more likely to refer to the lack of a family friendly environment within engineering workplaces, a more significant contributor to their reasons for leaving the profession was a feeling of alienation within the prevailing workplace culture. The engineers who had left or indicated they were thinking of leaving the profession also tended to complain about competitive work relationships, and the lack of emphasis upon business ethics, environmental sustainability, and the social implications of engineering projects. They were also more likely to express a strong desire for more innovative approaches to engineering work. Women engineers who refused to adopt masculine patterns of behaviour were also more likely to leave the profession than those who conformed to prevailing styles of behaviour.

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