Investigation of Gender Inclusivity of Student Exposure to Engineering Practice at UWA

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Abstract

In this project we explored and compared female and male students’ experiences of exposure to engineering practice while studying at the University of Western Australia, as an initial contribution to ensuring that industry engagement is designed to be gender inclusive. Transcriptions from detailed interviews with students found evidence that female engineering students experienced marginalizing interactions in the workplace. The experiences corroborated a US study that identified four categories of marginalizing interactions of practicing female engineers.

The project formed a foundation for a successful OLT proposal, along with two partner universities, to expand the investigation and develop and test recommendations for gender inclusive student exposure to engineering practice.

Approach

Six final-year engineering students were interviewed. These included 4 female students and two male students. Students were interviewed primarily in relation to their professional practicum, which represents the most significant exposure to engineering practice for most UWA engineering students. This consists of 12 weeks of placement with an engineering company or companies, and is typically taken during one or more vacation periods prior to their final year.

The interview questions were based on the theory of possible selves (Markus and Nurius, 1986), which links students’ awareness of possible future roles with their motivation towards their studies. Through exposure to engineering practice, students develop perceptions of possible future selves. Based on the theory, students’ motivation is influenced by whether these perceptions are appealing, disconcerting, and achievable.

The interview questions included general questions about the students’ practicum or vacation employment, questions about encounters in the workplace, and questions about appealing or disconcerting features of possible future roles students became aware of. The students were also asked to comment on any other encouraging or disconcerting aspects of the workplace, and how exposure to practice had influenced their identities as future engineers.
Deliverables

Deliverables were to be:

1. a description and comparison of how exposure to engineering practice can be experienced by women and men at UWA based on case studies, and
2. a draft student questionnaire to validate findings across a wider engineering student population.

The data collected from the interview transcripts provided evidence that female engineering students experienced marginalizing interactions in the workplace. Findings were compared with the four categories of marginalizing interactions that Hatmaker (2013, p387) found in interviews with 52 female engineers in the USA, namely: interactions that amplify their gender, having gendered expectations imposed on them, being ignored, and having their technical abilities doubted. Each of these four categories had been experienced by at least one student in the UWA sample.

Male and female students in the study reported that their credibility was doubted by tradespeople, technicians, or draftspersons. All of the students were able to gain respect from these people and learn from them. However the female students achieved this proactively, consistent with studies such as Hatmaker’s. One female student articulated how she did not wish to do this repeatedly in her future career and therefore returned from her experience doubting, for the first time since she was ten years old, that she wished to be an engineer.

From the interviews and additional literature a draft questionnaire was developed and used in the OLT project outlined below.

Outcomes

Outcomes were to be the following.

1. UWA engineering faculty will have increased awareness of gender inclusivity and resources to inform gender inclusive design of exposure to engineering practice in the new Master of Professional Engineering and the new Engineering Science major.
2. The deliverables will also be used by the project team as a foundation for an OLT proposal to refine the questionnaire based on case studies at additional universities and use it in a national engineering student survey. Survey results will be used to develop and test guidelines for inclusive exposure to engineering practice including tools for monitoring gender inclusivity, disseminated nationally. An outcome will be adoption of guidelines in the OLT project’s partner universities.

The project findings will be reported to the Faculty of Engineering, Computing and Mathematics Education Committee, which includes representatives from all disciplines. The project team will hold a workshop as part of the UWA Engineering, Computing and Mathematics Faculty Academy for Scholarship in Education on 11 November 2014. All staff will be welcome to attend. The project team will also hold a workshop at Engineers Australia on 22 July 2014. This will be attended by professional engineers and employers. Additionally, a manuscript is being prepared for submission to a journal.

The findings of the project were used as the foundation for a successful $50,000 OLT seed project proposal, SD13-3416 'Gender inclusivity of engineering students' experiences of
workplace learning'. The project involves UWA, Curtin University and the University of Technology, Sydney. An online student survey is currently open, based on the UWA project findings, literature, and advice from the reference group members. The project will also include student interviews and development and testing of workshops, based on the study findings, to help female and male students prepare for workplace experiences. The OLT seed project team will hold a workshop at the Australasian Association for Engineering Education Conference in Wellington in December 2014.

### Budget Expenditure Statement

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<th>Description</th>
<th>Cost</th>
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<td>Focus group catering</td>
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<td>Transcriptions</td>
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<td>Estimate for catering for workshop at Engineers Australia (22 July 2014)</td>
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### References
