

DISENTANGLED NARRATIVES: EXPLORING LECTURERS AND STUDENTS' GENDERED DISCOURSES IN AN ENGINEERING FACULTY

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Recent theoretical developments in studies of gendered experiences in mathematically demanding practices (careers and professional contexts) have stressed the relevance of exploring how different discourses construct these experiences and how they may be resisted, contested and changed. This is a case study in a STEM faculty in Chile, faculty that offers an interesting context to explore the intersection between social discourses (a national feminist movement), institutional transformation (a growing institutionalization of gender equity policies), particular academic cultures (mathematically intensive engineering careers in different areas of STEM) and individual gendered identities. It shows that gender and sex become visible in different discourses: in narrating negative personal experiences in female students, in perceiving negative female peer experiences in male students and in describing women and their value in the STEM culture in male lecturers. We discuss how this visibility is linked with how mathematics and engineering is constructed in the particular case and how these discourses can be reproductive or become a vehicle of change.

INTRODUCTION

The underrepresentation of women in mathematically demanding careers and subsequent lack of them in the workforce has been presented as a matter of concern by several science and mathematical organizations. In related undergraduate programs (i.e. STEM careers) women have historically enrolled in lower proportions than men, quantities that have remained persistent despite interventions. In addition, there is a progressive decline of women in advanced levels of these careers (the leaky pipeline). Several authors have linked recruitment and retention problems with various barriers and difficulties experienced during the undergraduate degrees. Much of this research has described a “chilly climate”, such as reported sexist humour, male-dominated discussions, hostile and even abusive environments and offensive comments made about women’s academic and mathematical ability (e.g. Blickenstaff, 2005). This “chilly climate” has been considered an important explanation of women’s difficulties to participate fully and belong.

Most of the research on the “chilly climate” has emphasized how the environment/culture relates with alienation of women. However this study follows a different approach: it tries to understand how through discourses different actors in the academic cultures construct these gendered experiences. Following other authors that have taken socio-cultural and post-structural approaches (e.g. Solomon, Radovic & Black, 2016; Stentiford, 2018), it adds to the “chilly climate” hypothesis by considering how students construct through agentic “identity work” their mathematics students’ gendered identities and their gendered academic cultures. It also adds to this research by exploring

the positioning of male peers (Stentiford, 2018) and lecturers (Blair et al, 2017), and how this positioning contribute to maintain, resist or change particular gendered cultures. These approaches emphasize the relationship between individual agency, local and social discourses and allow exploration of interactions between different gendered positions in a particular context.

The context of this study is of particular interest to explore the intersections of gender, mathematics and engineering identities in social, institutional and individual changing discourses. It is focused in the biggest and most competitive Chilean public university STEM faculty in Santiago. The undergraduate program has high academic standards for admission, includes 2 years of an intensive mathematical common core and offers 13 careers that students choose after the first 2 years. These careers in different areas of STEM (e.g. mathematics, biotechnology, computing, civil engineering) belong to different departments that are relatively independent and vary in terms of women representation. The faculty has been historically perceived as a male dominated environment and there has been several initiatives oriented towards gender equity: a women faculty network (started 2008), an affirmative program to promote female students' entrance (established in 2013), a growing institutionalization of gender equity policies and a growing number of female student enrolment (from 19% in 2008 to 26% in 2018). In addition, in 2018 a national feminist women movement that started inside universities took place in Chile. The movement was against gender discrimination, abuse and inequities in general and particularly in higher education. The university and some departments focus of this study were highly active in this movement: students stopped university activities for more than a month and did several activities to make gender inequalities visible.

After the feminist movement we started different processes of data collection in 4 departments that represented different areas of STEM. We focused on the following research questions: What discourses do students and lecturers use to construct the experiences of the students in the faculty and in particular departments? How these discourses construct different gendered cultures, particularly in relation to how mathematics and STEM are constructed? How do female and male students and lecturers discursively position themselves in relation to gender equity and gendered experiences of students? How discourses in the particular departments compare?

METHODS

This is an undergoing multiple case studies of different departments nested in a Faculty (Yin, 2003). It includes two main phases: 1) Construction of independent cases using similar procedures for data collection and analysis; and 2) Comparative analysis. We will focus this report on one case department and will be able to discuss results of the comparative analysis next year if accepted.

In the department focus of this report we collected three group interviews with female students, two group interviews with male students and 7 individual interviews with faculty members. Individual and group's interviews were semi-structured, focusing on students' experiences in the department and lecturers' perception of the department and of the experiences of students in it. The interviewer invited interviewees to talk about these themes and then openly listened to participants' descriptions and asked for examples and stories. Interview questions specifically about gender influences on students experiences were asked near the end of the interviews to allow for spontaneous mentions

first (Seidman, 1998). Group interviews lasted about two hours and individual interviews about one hour and both were audio recorded and transcribed.

The analysis in each case was organized in two main phases. Phase one was a thematic analysis of what students and lecturers said about students' experiences in the engineering department. We followed the steps suggested by Braun and Clarke (2012) and identified themes such as academic and social obstacles/barriers and supports, perceptions/descriptions of the discipline, and teaching, learning and evaluation practices. The second phase was an analysis of the way in which gender was considered or not in how students and lecturers organized their discourses (e.g. discourse analysis in Willig, 2001; Lim, 2008; Blair et al., 2017). We first identified all segments where the actors made distinctions in relation to gender. Then we analyzed in what way these distinctions were made, for what purposes and what implications these discourses may have in students' experiences and in the academic culture of the department.

RESULTS

In regard to the discourses that women students raised about their experience in the department, the existence of difficulties to position themselves as academically prepared or capable appeared fairly consistent: fear of feeling stupid, looking silly in front of others, or failing were mentioned in all group interviews. Although they recognized this program in engineering as highly demanding in general, they associated these difficulties to some extent with being a woman. They mentioned situations in which they heard sexist or sexual jokes from their peers and comments related to the domestic role of women from their lecturers (being positioned outside the mathematics/academic context), male peers and lecturers' attitudes in which they felt underestimated (being positioned as non-competent mathematically), and work overload in teamwork situations in which they felt their male peers neglected their responsibilities (being positioned as leader/responsible).

In male students discourses similar difficulties to position themselves as capable were mentioned. However these difficulties were never linked to their gender. When asked about specific difficulties that female students may encounter, male students identified most of the challenges that their female peers described, and said they became more aware of these difficulties after the feminist movement. The feminist movement was constructed by these students as a women's movement, highlighting women's protagonism and therefore their responsibility to challenge these barriers.

Finally, unlike students, most of the interviewed lecturers narrated students' experiences from a general perspective, without any spontaneous mention of specific challenges for women. When we asked them directly about specific barriers that female students could encounter, they tended to minimize them through different discursive mechanisms. A common mechanism was the reformulation of women's experiences and contributions as positive. For example, female students were discursively constructed as different to the typical student, with high abilities for organization, communication, management and leadership within groups. Throughout the lecturers' discourses a subtle devaluation of these abilities was found. In some interviews a difference was established between these "soft/social skills" and "technical skills", enhancing the latter. In addition, lecturers explicitly expressed obstacles to evaluate these "soft/social skills" (e.g., teamwork), describing subjective and unsystematic forms of evaluation.

DISCUSSION

The gendered discourse observed in students and lecturers' interviews in the particular department was framed by the feminist movement in 2018, which raised and made visible several of the difficulties that women may encounter in higher education. The positioning within these discourses may limit students and lecturers' agency and possibilities for communal organization against discrimination and practices of exclusion. Female students seem to be constructing a feminist discourse in which gender inequalities happen because they are positioned by peers and lecturers in places where they feel uncomfortable. Male students perceived and even empathized with difficulties their female peers encounter in this academic culture, but data suggests they position themselves as passive observers of these difficulties. Finally, male lecturers' discourses construct a reality where gender no longer acts as a variable that prevents inclusion of female students. This 'gender blindness' (Blair et al., 2017) does not allow them to challenge possible barriers that female students' may be experiencing in the department, and therefore it also does not allow lecturers to position themselves as agents of change. Mathematics is differently linked with gender in students' and lecturers' discourses. In students' discourses, it seems to act as a general context that is no longer constructed by the students as masculine. In lecturers' discourses, oppositions between technical and social dualism (Leyva, 2016) still seem to be acting as a discursive mechanism that may be positioning women at the margin of the discipline. The implication of these positionings of mathematics will be explored and discussed in relation to the construction of different areas of STEM in the comparative analysis.

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