High Educ (2011) 62:113–127
DOI 10.1007/s10734-010-9369-8

Contradictory values in doctoral education: a study of gender composition in disciplines in Swedish academia

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Published online: 24 September 2010

Abstract Contradictory values in the Swedish doctoral education system are analysed through an interview and survey study of different academic disciplines: female-dominated, mixed and male-dominated. The focus is directed towards how the selected disciplines conduct application and selection processes in doctoral education and special attention is given to values regarding doctoral ideals, what a successful thesis should be like, how gender balance or imbalance is explained, and how activities aiming at gender equality are carried out. In the findings of this study, some specific patterns that show gendered discipline cultures in relation to doctoral education are apparent. The analysis shows an unclear or ambivalent view on gender and gender equality work in doctoral educations. In many of the issues investigated, essentialist views on gender emerge and a focus on gender differences is evident. The implicit assumption is that men and women are different and contribute to the discipline in disparate ways. The effectiveness of gender-specific doctoral strategies and to what extent gender equality work is viewed as a support strategy for women only, is discussed.

Keywords Higher education · Doctoral education · Values · Gender equality · Academic discipline

Introduction

The study presented in this article generally seeks to increase knowledge about gender equality in Swedish academia and career opportunities available to both women and men with graduate degrees from various disciplines. The study is a continuation and deepening of earlier projects showing that gender equality circumstances, like for instance career opportunities, vary with discipline and sometimes with the gender-composition of the discipline (Lindberg et al. 2005; Silander 2005). The aim of this study is to analyse that variation and elucidate how different academic disciplines—female-dominated, mixed and

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male-dominated—conduct application and selection processes in doctoral education. In this article, special attention is given to differences in values regarding doctoral ideals and gender equality in doctoral education which can also be of interest to academic work in other European countries.

Several studies show that disciplines have cultural variations and different ways of valuing knowledge and doctoral education goals (Deem and Brehony 2000; Gardner 2008; Hakala 2009; Parry 1998; Ylijoki 2000). Different disciplinary cultures are often explained using dimensions like hard–soft, applied–pure, and non-life–life, or similar. Moreover, these dimensions of discipline culture are often clustered together in different faculty areas. For instance, in a faculty of natural science more disciplines are labelled as "hard" and in a faculty of humanities or social science more disciplines are labelled as "soft" (Becher and Trowler 2001; Biglan 1973; Bourdieu 1988).

Nevertheless findings concerning *gendered* disciplinary cultures are of great interest. Gendered cultures can be shown to exist through differences in manifested values and activities in male/female-dominated disciplines. Research concerning how concrete activities aiming at gender equality in doctoral education, in this article referred to as gender equality work, is carried out in each of the studied disciplines is illuminated. Are there any differences in the culture of female-dominated, mixed and male-dominated disciplines in relation to doctoral education? The ambition to analyse conceptions and experiences of differences might conflict with constructionist conceptions of gender. The reader should bear in mind the problem of trying to break up static gender categories while simultaneously focusing on the difference between male and female-dominated disciplines.

Doctoral education in Sweden

Since 1998, numerous regulations have been introduced to Swedish postgraduate studies which have made admission procedures appear more formalised. The rather significant changes have been undertaken in order to even out differences among faculties and disciplines. The reforms have led to increasing efficiency and productivity, but the influence on the quality of research has not been evaluated (Kim 2002). The reformed regulations stipulate an open and clear application and selection process to postgraduate studies. The criteria for admission should also be made public.

Each doctoral student is entitled to two research supervisors, one principal and one assistant. Individual study plans are important, as is guaranteed funding. Supervisors should also undergo relevant training (SOU 2004:27). However, these new recommendations and new admission procedures may also have provoked acts of resistance to defend the disciplines' traditions, such as the supervisor's right to choose his or her own doctoral students and to treat doctoral education as an opportunity to get the supervisor's own research done.

In Sweden today, more women than men attend higher education. In 2007, 60% of undergraduate students, 49% of doctoral students, 57% of junior lecturers, 39% of senior lecturers and 18% of professors (only full professors, not assistant or associate professors, are labelled professors in Swedish statistics) were women. 42% of the overall teaching and research staff were women. This indicates that there are still somewhat more men than women from similar undergraduate or master programmes continuing to doctoral studies: 14.6% men and 11.6% women (Swedish National Agency for Higher Education 2008). The transfer rates from undergraduate to postgraduate studies vary a lot among different disciplines in Sweden, but have been increasing since the 1990s. Natural sciences and

medicine have the highest transfer rates and social sciences the lowest. The transfer rate also differs among higher education institutions. The natural sciences still have a lower proportion of female doctoral students, while the rest of the faculties have levelled out these gender differences (Lindberg et al. 2005).

Sweden is a country with a fairly long tradition of gender equality work in society in general and also in academia. A law on equality between women and men in working life, mainly focusing on gender mainstreaming, came into force in 1980 (Law 1979:1118). This legislation has successively been reinforced to also cover gender equality within education. Today it is imperative for all employers with more than ten employees to map the salaries paid and to draw up and apply a plan for equality between women and men (Law 1991:433).

Gender equality in academic careers

Studies suggest that higher education institutions have a long way to go concerning gender equality. Women experience the academic culture as being masculine with hard career conditions and too much competition, and therefore a system not suited to women. Some researchers argue that academic career systems discriminate against women and force women to leave the academy (Husu 2001; Probert 2005; White 2004). On the other hand, some studies in Sweden suggest that women are not discriminated against regarding appointments for senior positions in the academy and that gender equality is reached in transfer rates between undergraduate and postgraduate education (Ds 1996:14; Falkenberg 2003).

Some researchers argue that without repairing the leaks in the academic career pipeline, some faculty areas will continue to be gender-imbalanced and gender-segregated (Kulis et al. 2002). For doctoral students, gendering processes and hidden discrimination are found to lead to women dropping out of doctoral education (Kantola 2008). Xu (2008) suggests that the under-representation of women is not explained by household and family responsibilities or by different intentions among women and men to leave academia. Instead, female drop-outs from doctoral studies should be explained by academic cultures that provide women with fewer opportunities, unequal chances to take up leadership positions and limited support. Therefore, cultural change is required.

Different (and gendered) disciplinary values

Research in this area often claims that there are different ideals in doctoral education among disciplines, concerning for instance individual or collective work, types of doctoral theses, aims of theses and collaboration between doctoral students and their supervisors (Becher and Trowler 2001; Nilsson 2009; Schoug 2004). There is also previous research suggesting differences in *gendered* disciplinary values, both generally and in relation to doctoral education. Disciplines with many women are often categorised as "feminine", soft and applied research areas. At the same time the "male" academic culture is often said to discriminate against women and disciplines with a feminine identity. This leads to exclusion, lower status, lower salaries and other disadvantages for women and "female" disciplines (August and Waltman 2004; Becher and Trowler 2001; Kulis et al. 2002; Umbach 2007). In gender equality work, strong "male" disciplines like physics aim at

changing staff gender composition instead of focusing on a qualitative change of academic culture (Viefers et al. 2006).

Gender differences are often found in studies of undergraduate, graduate or postgraduate education. These studies suggest that open and regulated admission procedures, as well as explicit and communicated admission criteria, are generally advantageous for female students (e.g. Åsberg et al. 1999). Other suggested steps towards attracting more women are adherence to female PhD students' preferences for collaborative work and working in gender-homogeneous groups (Conrad and Phillips 1995; Tynan and Garbett 2007). Some researchers suggest that in order to attract more women into science studies, disciplines must become more sensitive to women's needs, for instance by offering more flexible working hours and child-care arrangements (Sax 2001). Some other studies focus on how to create women-friendly campuses and a positive climate for female students (Gardner 2008; Wolf-Wendel 2000). Many of these studies are based on the view of men and women as being essentially different from each other, with separate needs and ways of working. This view will be related to findings in this study and discussed later on in this article.

Theoretical and methodological framework

The present study is mainly inspired by Bourdieu's (1988) research and theories about core values of academic disciplines and views and practices on gender and gender equality. Gender is seen as being socially constructed and can be an influential factor for understanding a specific phenomenon like a discipline culture (Bourdieu 2001; Moi 2002). Bourdieu's non-essentialist way of understanding sex and gender categorisations is a main thread in how the results of this study will be understood and discussed on a meta-level.

Universities can be understood as being places of struggle where conditions, criteria and hierarchies are decided and disciplinary identity is constructed in relation to current context. Differences in disciplinary cultures can become visible by exploring what criteria and norms that are valued scientifically or scholarly important in different positions of the academic field (Bourdieu 1988). To understand a certain discipline's core values, the discipline culture can be regarded as heavily influencing the identity work of new members, such as doctoral students, into the value patterns of that specific discipline (Haake 2009).

In order to understand the social construction of discipline cultures and gendered cultures, it is important to bear in mind that the order of the world is often accepted as being natural and universal. Non-transparent and static social structures hinder change in the taken-for-granted gender categorisation (Bourdieu 2001). One question of relevance that arises in relation to this argument is: In what ways are gendered discipline cultures an obstacle for gender equality work in relation to doctoral education?

The case disciplines of study

The study focuses on six academic disciplines in Sweden. As a first step, statistical evidence was used to determine male-dominated disciplines in Sweden (more than 75% men), female-dominated (more than 75% women) or gender mixed (40–60% of women and men respectively), with regard to each discipline's total amount of employed teaching and research staff. Two disciplines from each category were then selected using criteria of variation of faculty and type of discipline. The result of this selection rendered two disciplines from the humanities (hum—both mixed), two from social sciences (soc—one male and one female) and two from natural science and medicine (nat/med—one male and one

female). The disciplines vary substantially in size and also include one discipline closely connected to a professional field. Since the smaller disciplines have few senior staff and are located at only a few universities, discipline names have been made anonymous in this study.

The interviews

The data collection included 24 interviews (13 women and 11 men). Two interviews per discipline were conducted at each of two large selected Swedish universities. Questions were directed to supervisors and directors of research studies. In the male-dominated disciplines, five men and three women were interviewed. In the gender-mixed disciplines, four men and four women, and in the female-dominated disciplines six women and two men were interviewed. However, the sex of the informants is considered less important, as the study focuses on gendered discipline cultures which can be upheld by both men and women in each discipline.

In the processing of interview data, informants' views were categorised under each question. Next, every informant's categorised statements were related to all the others. Inspired by Bourdieu (1988), the purpose was to position them in relation to each other based on what categories they attached significance to, regarding all questions in the interviews. A version of Multivariate Correspondence Analysis, Homals (Hair et al. 1998), was employed in this phase. The result of the analysis was plotted onto a two-dimensional "map", with each dot corresponding to an informant. Those whose views resembled that of others were clustered close to each other on the map, but distant from other informants (Haake 2004; Hair et al. 1998). The result of this process showed that informants from male-dominated disciplines were clustered near each other and at a distance from female-dominated and gender-mixed disciplines. Further the faculty affiliation of the disciplines taking part in the study was not as important as gender composition in this positioning process. These results gave rise to a larger survey investigation, in order to establish whether these patterns of differences would be manifest in a larger scale study too.

The survey

A survey, mainly based on questions and answer categories from the interview study, was carried out. An extensive electronic survey was sent to all senior staff, like professors and senior lecturers, in the six selected disciplines at every Swedish university that had post-graduate education within the studied disciplines. The expectation was that academic staff with an insight in doctoral education and experience of doctoral supervision would make time to answer the survey.

Defining the number of staff with relevant knowledge using only staff records turned out to be problematic. The records were not always up to date and rarely gave more information than name and title. It was decided that the electronic survey would be sent to all senior staff with relevant titles (like senior lecturer, associate professor and professor). A total number of 283 answers were returned, yielding a total response rate of 30%, spread relatively evenly over the six disciplines in relation to the size of each discipline. 30% can be seen as sufficient, since the number of senior staff that does not have experience of doctoral education can be rather high and since staff records can include both emeriti and those no longer working at the specific department. Since the results from the survey and interviews resembled each other, the possibility of bias due to a low percentage of answers is not likely. 89% of those answering the survey had experience of doctoral student

supervision, 40% were professors and 30% were females. 26% ($N = 73$, 51 women and 22 men) were from female-dominated, 11% ($N = 30$, 16 women and 14 men) from mixed, and 64% ($N = 180$, 19 women and 161 men) from male-dominated disciplines. Different statistical analyses of the material were conducted and factors from explorative factor analyses as well as differences in variance between mean values (X) for groups in the material have been tested for significance. Cronbach's alfa tests of reliability in the internal homogeneity of the explorative factors are also accomplished. All of the results described in this paper are significant on at least the level $p < 0.05$ and in some cases on the level $p < 0.001$.

Findings: contradictory values in different kinds of doctoral education

Drawing on the results from the survey and interviews, the studied disciplines and their doctoral education do indeed show gendered discipline cultures concerning some aspects of doctoral education. Patterns also exist in comparisons of the faculties in which the disciplines are found. I will start with the latter.

Differences in discipline cultures in relation to faculty affiliation

Similarities among disciplines from the same faculties are related to more formal and procedural aspects of doctoral education and are found mainly in two areas of interest in this study: the admission procedure for new doctoral students and how doctoral education is handled generally.

The application and selection processes of new doctoral students are handled differently in the natural science and medicine (nat/med) disciplines compared with the others. In the humanities (hum) and social sciences (soc) disciplines, the admission procedure is based mainly on a collegial rationale (soc 84%, hum 69%, compared with nat/med 29%). This rationale means that application and selection are coordinated in special admission committees where colleagues are involved and where there are shared criteria for the rating of doctoral candidates. Within nat/med, an individual rationale is more common, or the individual rationale is combined with the collegial (nat/med 71%, compared with hum 31% and soc 16%). The individual rationale is based on each supervisor or director of research having responsibility for the application and selection process. It is up to each individual supervisor to decide the criteria used in the selection of doctoral students and also to assess the applications. Teachers from nat/med also view the whole admission procedure as being less open and less exposed to competition than those in the other disciplines. In the interviews some of these informants describe the "hand-picking" of doctoral students.

> I think we will get more directions or recommendations on how to handle admissions, because it has been completely like the Wild West, for both good and bad. (…) And then it is of course about openness and that everyone should have the same possibilities to apply and that has not been fulfilled since we have used the 'hand-picking version' of doctoral admission. (…) So I think that open applications are something good. (m, male, nat/med)[1]

[1] In parenthesis the sex of interviewee (m or w), if the discipline is male-dominated, mixed or female-dominated (male, female or mix) and if the discipline is in the area of humanities (hum), social sciences (soc) or natural science and medicine (nat/med) appear.

Another area where the findings from this study confirm previous research of discipline cultures concerns questions about *how doctoral education is handled generally* (see Table 1). Two statements in the survey show significant differences among all three faculty areas. In hum, doctoral students write their own thesis texts and are sole authors to a higher degree than in soc and nat/med. Doctoral students also work on their supervisor's research projects to a lower degree than in the other discipline areas.

Statements where disciplines from the humanities significantly distinguish themselves from the others are firstly about to what extent doctoral students write their thesis based on a folio of published work. In hum this kind of thesis is done to a much lower degree. Secondly, doctoral students are viewed as more independent in the humanities disciplines than in the other. Thirdly, hum graduates are judged to have a greater knowledge than their supervisors in the specific field of research of their thesis to a higher degree than PhD students from other disciplines.

For some questions, the disciplines from nat/med differ significantly from the others. Doctoral students work alone on their research projects to a lesser extent. In addition, these doctoral students have fewer possibilities of influencing the choice of research questions, theories and methods in their research projects than other doctoral students do.

Differences in discipline cultures in relation to gender composition

Gendered patterns of discipline culture are found in relation to more informal aspects of doctoral education, such as values and attitudes towards doctoral education and gender equality work. Significant differences between male-dominated and female-dominated disciplines regarding values and activities in relation to doctoral education are apparent in several areas in this study. In an explorative factor analysis, the values on *criteria for ranking doctoral student applicants* show some differences among the female-dominated disciplines versus the others. For the factor labelled: "traits, experience and usefulness", significant differences were found. Female-dominated disciplines deviate by devoting considerably more attention to life experience and working life experience when selecting new doctoral students. They also to a larger extent value the "right" personal traits, the usefulness of the doctoral student in departmental work (for instance in teaching), and the experience that is needed to formulate a research plan of high quality. In contrast,

Table 1 How doctoral education is handled generally. Differences according to faculty affiliation. (Mean values (X) on a scale from 1 = disagree to 6 = fully agree)

Type of statement	Hum ($N = 30$)	Soc ($N = 61$)	Nat/med ($N = 192$)
Doctoral students write their own texts as sole authors	5.2	3.4	1.9
Doctoral students work on their supervisor's research projects	2.4	3.4	4.8
Doctoral students write their thesis based on published work	2.2	5.6	5.4
Doctoral students are independent	5.2	3.9	3.9
Doctoral students have greater knowledge than their super-visors in the specific field of research of their thesis	4.7	3.9	3.5
Doctoral students work alone on their thesis projects	4.7	4.0	3.3
Doctoral students can influence the choice of research question	5.3	5.0	4.1
Doctoral students can influence the choice of theories and methods used in their research projects	5.2	4.9	4.3

respondents from male-dominated disciplines value previous academic performance (grades) much more highly than experience when ranking doctoral student applicants.

> We focused on interviews and the research plan. (…) And sure, we considered that some of them might be shy but we wanted to see their personality. They have to work in a bigger context, in a research context, together with other doctoral students and at the department. (w, female, soc)

> I think it is important to have a person with the right discipline and course background, so to speak, so that they don't have big knowledge gaps. No matter how nice that person is, there will be a lot of work if their knowledge gaps are too big. (w, male, nat/med)

In the area of *the role of the thesis* for doctoral education, factor analysis yielded a significant difference between female- and male-dominated disciplines for the factor "utility value and usefulness internally and externally". In female-dominated disciplines, the merit of the thesis was valued higher, especially regarding the usefulness of "the book" produced, as course literature, as a product that can distribute new knowledge for the public good and for use in different work domains.

> Well, one role of the thesis is as an education tool. But the other role is that it hopefully will generate new knowledge that is of benefit to society. So if you say like this, it would be a pity if the doctoral research project would not have any relevance for society, or that it is carried out as an experiment only for the sake of the doctorate degree. (w, female, soc)

Values regarding *the ideal doctoral student* differ among female-dominated disciplines in relation to the others for the factor "sociable and contact-building". Staff from female-dominated disciplines report that ideal doctoral students are open, sociable, nice, and have strong integrity (e.g. in attitude towards supervisor's advice). They have a life outside of their studies and they are good at creating new contacts. These aspects are not given the same high ranking in the other environments.

> The ideal doctoral students are those who learn fast, who take own initiatives, who express themselves well…, and who at the same time are critical and put us up against the wall. It is highly dangerous with those who are yes-men. Instead you want those who are somewhat tougher. (w, female, soc)

> The best doctoral student is someone who's hungry for knowledge and is prepared to take on great personal responsibility and who is prepared to go outside this narrow circle [e.g. the department] to get a better education. Those who take courses at other faculties or other universities and who search for people who has the knowledge that we who supervise don't have [are ideal doctoral students]. So we want doctoral students with a high degree of independence and the ability to establish that kind of contacts. (m, female, nat/med)

Explanations to *why there is gender imbalance* within four of the disciplines differ significantly for two factors. The female-dominated disciplines attach more importance to the factors "undergraduate education is dominated by one sex and results in occupations that are gender-labelled" and "the discipline is gender-conscious and of low status". Informants from female-dominated disciplines emphasize historical and cultural explanations, where discipline content and kinds of occupations the education leads to are gendered. They also, to a significantly higher degree, explain gender imbalance by referring to the discipline's qualitative (instead of quantitative) alignment, that they teach

gender-conscious courses and that "female" disciplines generally have lower status. Male-dominated disciplines, on the other hand, attach greater importance to a lack of role models from the under-represented sex in their disciplines.

> Somewhere I have read…that if we only got more men in our discipline, we would also be better paid. It would raise our salaries… and that would strengthen our discipline. But, we are dealing with a traditional female occupation so… (…) I would love to see more men as colleagues here. (w, female, soc)

> But I don't know why a rather permanent gender-imbalance exists and differs between disciplines. It partly has to do with the lack of role models and good examples [of the under-represented sex]. And then we have the tricky question if there are biological explanations, which have been speculated… I don't want to eliminate that interpretation but it is hard to prove. (m, male, soc)

Gender-mixed disciplines explain gender balance in their discipline and doctoral education by referring to the fact that the discipline deals with both male and female interests, that the undergraduate courses are gender-mixed and that the education does not lead to occupations that are either male- or female-dominated.

Reasons for *why gender equality work in doctoral education is of importance* only differ for the male- and female-dominated disciplines in a couple of questions. Female-dominated disciplines seem to favour the explanation that gender equality work brings changes to the discipline's status and salaries and therefore possibly to changing the discriminating patterns of "many women = low status" ($X = 4.7$). Male-dominated disciplines do not agree that this statement is an important question for gender equality work ($X = 2.3$). This large difference is also evident in the interviews and fits in with the pattern of other questions in the survey. Another motive that respondents from male-dominated disciplines do not agree upon to the same extent is the statement that women and men have different interests that will enrich and broaden a discipline ($X = 4.4$), as compared with female-dominated ($X = 5.2$).

> Yes, I think that we see the world in different ways. I actually believe that. I really think it is true that there is a male eye on the world and that there is a male object of research. I don't like clichés or stereotypes regarding gender, but to some extent I think it is easier for men to perceive one kind of problem in our culture and there is also a need for another eye, the female eye. (…) Even though men can study women in culture, I think that a woman, purely because she is a woman herself, can see things other than what men can see in the female world. (m, mixed, hum)

Regarding *activities for concrete gender equality work* (see Table 2), all informants regardless of discipline affiliation agree on a number of statements, for instance that special treatment for the under-represented sex (affirmative action) during recruitment and promotion is not frequently used, nor an intervention of relevance in the future—rather the opposite. Moreover, they all agree that something that is only done to some extent today and that ought to be done a lot more in the future is structural change to facilitate the combination of family life and academic career.

Male-dominated disciplines value three activities in their gender equality work higher: they use persons from the under-represented sex as role models, they arrange mentors and networks for those of the under-represented sex, and they set concrete goals in gender equality plans to a significantly higher degree than other disciplines do. However, the other disciplines express a view that this last measure (concrete goals in gender equality plans) should be put higher on the agenda in the future.

Table 2 Activities for concrete gender equality work in doctoral education. Differences according to gender composition. (Mean values (X) on a scale from 1 = disagree to 6 = fully agree)

Type of statement	Female $N = 73$	Mixed $N = 30$	Male $N = 180$
Today: The usage of the under-represented sex as role models	2.4	2.7	3.7
Today: Mentors and networks for the under-represented sex	2.3	2.2	3.5
Today: Set concrete goals in gender equality plans	3.0	3.4	4.1
In the future: Should set concrete goals in gender equality plans	4.3	4.3	3.9
Today: Bear in mind gender-related questions in doctoral education seminars	3.2	3.9	2.4
In the future: Should bear in mind gender-related questions in doctoral education seminars	4.3	4.0	2.7
Today: Courses based on gender theories exist	3.0	3.0	1.7
In the future: Should have courses based on gender theories	4.4	3.2	1.9
In the future: Should work actively with career-planning for doctoral students	4.6	4.0	3.7

> Well, the simple truth is that we don't do an awful lot, because we are very incapable. But, what do we actually do? One thing of course is that those women who are here should feel all right, and that they are not discriminated against; rather they should get extra support. The female doctoral students that are in the system can be used as ambassadors or role models for undergraduate students; they should meet with them. But that is a rather passive activity in some senses. (m, male, nat/med)

> I don't know if we do any particular activities but I think and I know that female role models are important. I think it is important to inspire students by showing female doctoral students. (…) And then I think it is important that girls are encouraged… to apply for doctoral education, because as I said earlier they generally demand more of themselves before they apply. (w, male, soc)

Female-dominated disciplines differ significantly from male-dominated with regard to three activities in their gender equality work. They focus more extensively on gender and gender equality work in their doctoral education seminars. The difference is even larger regarding how important it is to work with this kind of activities in the future. There is also a significant difference regarding the question to what extent gender-based courses exist within doctoral education, as well as whether these kinds of courses should exist in the future. Respondents from female-dominated disciplines believe this to be considerably more important. Finally, all disciplines agree that at present they do not work with career-planning as a gender equality tool to any large extent ($X = 2.6$). However, female-dominated disciplines to a higher degree view career-planning as a tool for equal treatment as something that academia should work more actively with in the future.

The following discussion investigates how these gendered patterns of doctoral education can be understood and interpreted.

Discussion of gendered values in doctoral education

The analysis of the interviews showed that informants from male-dominated disciplines were clustered near each other and at a distance from informants from female-dominated

and mixed disciplines. This pattern was generally confirmed by results from the survey. However, other patterns also exist, for instance in comparisons of the faculties in which the disciplines are found. In this study, faculty-based patterns appear regarding more formal and procedural aspects of doctoral education, as admission procedures and the handling of doctoral education generally. Gendered patterns of discipline culture are found in relation to more informal aspects of doctoral education, as values and attitudes towards doctoral education and gender equality work. These gendered patterns are the main focus of this discussion.

In the findings of this study, some specific patterns that show gendered discipline cultures in relation to doctoral education are apparent. Within female-dominated disciplines, the right personality—the open, sociable and experienced person—is highlighted as being important in the selection of new doctoral students, such traits also being important for the ideal doctoral student. In addition, the dimension of usefulness and applicability are important in the selection phase and in statements about the ideal doctoral student as well as in the perceived role of the thesis. The doctoral students should be of use to their departments and the thesis should be useful both internally (as course literature) and externally for the application of research results in society. This way of reasoning can be seen as a strategy of choosing the right colleague who should make a contribution both to the department and for the common good. One explanation for this can be that female-dominated disciplines are not so old and are in the process of establishing a disciplinary knowledge base and promoting qualified academic staff. Another explanation found in earlier research is that women's career decisions within academia are influenced by the perceived social good of their career choice, while men are driven more by the search of monetary or status rewards (Sax 1994). Within male-dominated disciplines of this study, statements about personal traits, usefulness and applicability are not felt to be important. Instead, previous academic performance (i.e. grades) is more important in the search for new doctoral students.

There is one aspect raised in the male-dominated disciplines that not only explains the present gender imbalance but also suggests how to achieve a better gender balance in the future. The explanation is the absence of female role models and the suggested measures are investments in and usage of those role models, as well as in networks and mentors for women only. It can be argued that the reason for gender imbalance in male-dominated disciplines is based on internal explanations; that the power to change lies to a high extent within the discipline itself. At the same time interventions are made to support the under-represented sex through gender homogeneous groups, in this case as special treatment measures for women only, activities that some researchers are also in favour of (e.g. Conrad and Phillips 1995; King 1998; Viefers et al. 2006).

Explanations for gender imbalance within female-dominated disciplines instead target factors outside of the discipline. It is suggested that historical and cultural factors of society have influenced the gender-labelling and status of work domains and occupations. Supervisors from female-dominated disciplines experience more distinctly that the status and credibility of their disciplines are low. This can explain why it is hard to get more men to apply for positions in their areas. Other studies also point in this direction (e.g. August and Waltman 2004; Umbach 2007; Viefers et al. 2006). Concrete gender equality work also differs, tending to consist of more general activities that are not based on special treatment of the under-represented sex. Instead, gender-conscious doctoral courses for both men and women are encouraged. The problem is, however, that only a few men take part in these courses since the disciplines are so dominated by women. Maybe these interventions do not change the gender-balance in favour of men; the knowledge remains exclusively for women.

Are strategies for gender equality work presented in this study based on gender differences, gender similarities or both at the same time? The analysis shows an unclear or ambivalent view of gender and gender equality work. On a meta-level, in many of the issues investigated, essentialist views on sex/gender appear and a focus on gender differences becomes evident (Bourdieu 2001). The implicit assumption is that men and women are different and contribute to the discipline in disparate ways. Strategies where role models of the under-represented sex are used to attract or retain doctoral students of the under-represented sex are based on the assumption that women are more like other women and will feel less lonely if put together (the same logic is also obvious for men). These strategies of gender equality work based on gender differences are applied more extensively in the male-dominated disciplines.

At the same time, male-dominated disciplines do not agree as much as the others with the statement that women and men have different interests that will enrich and broaden a discipline. Consequently, it seems like informants from female-dominated and mixed disciplines view men and women as being intrinsically different more than the male-dominated disciplines do. As demonstrated, the focus on gender similarities or differences alters depending on the question at hand. If the question focuses on values, male-dominated disciplines tend to highlight gender similarities. Conversely, if the question is about concrete gender equality work the rationale is based more on gender differences, differences that are often self-evident and taken for granted in everyday situations (Bourdieu 2001; Moi 2002). Gender differences are therefore strengthened; sometimes in attitudes (female-dominated and mixed) and sometimes in actions (male-dominated). The construction and reconstruction of gender differences is often made unconsciously. Instead there is a need for conscious deconstructions of the grouping of individuals in two different categories, where the goal is to empty these categories of the meaning they hold today (Moi 2002).

Another important question concerns the effectiveness of gender-specific support strategies, which informants from male-dominated disciplines favour to a larger extent than those from the female-dominated ones in this study. According to other studies (Blackmore 2006; Haake 2009; Madden 2005), gender-specific interventions may turn out to be counter-productive as they might contribute to increased dualism between the sexes and to the preservation of traditional gender roles. This kind of gender-specific strategies can contribute to a situation of being satisfied with gender equality measures at the individual or group level instead of working with more comprehensive gender-related interventions that include both men and women and are carried out in the whole discipline and the whole institution.

Another interesting question is to what extent gender equality work is viewed as a support strategy for women only. Should gender equality work always favour women, or should it support the under-represented sex regardless of male or female dominance in a discipline? How acceptable is it in female-dominated disciplines to hold the view that gender imbalance is unproblematic and that female dominance is acceptable? Conversely, is this view at all possible in male-dominated environments?

> There are a lot of successful women when it comes to research and doctoral education, but one should not exclude any group. You should see beyond male and female and look at the competence instead. (…) But well, men should not be excluded, but I do not think that there is any reason to try to get more men, because there is no evidence that men would be more successful than women. (w, female, nat/med)

Read the above quotation again and change the word "women" with "men" and "men" with "women". Would that view be possible to hold in today's universities?

If gender equality work is to be effective, universities, disciplines and directors of research studies should try to answer the following what, why and how questions in collegial discussions:

- What and why: What is meant by gender equality work? Is it something for women only or something that should support the under-represented sex, no matter which, at faculty or disciplinary level? Why is gender equality important?
- How: Are men and women essentially similar but constructed and treated differently (unequally), something which should therefore be changed, or are men and women essentially different from each other and therefore need to be treated differently in order to achieve gender equality?
- How: Is gender equality favoured by gender-homogeneous activities or should gender equality work focus more on common discussions of conceptions, prejudices and attitudes that confine women and men to traditional gender categories and uphold gender differences and the construction of feminine and masculine disciplines? Should gender equality work perhaps open up for new constructions of gender and disciplinary membership?

If these questions are thoroughly discussed, perhaps values and activities for concrete gender equality work in different doctoral education contexts would not be as gendered as is shown in this study and discussions of the numbers of men and women (quantity) can give room for more qualitative gender equality discussions and actions.

Acknowledgments The author wishes to thank the Swedish Council for Working Life and Social Research which is financing the research project entitled "Gender Equality and the Academy: When Desires and Choice Face Hindrance, Opportunities and Resistance", which this study is a part of. Thank you also to all informants who have put time and effort into participating in this study and to Dr. Kent Löfgren for assistance in the statistical processing.

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