PhD Supervision
at Faculty of Engineering, Science and Medicine, Aalborg University

Anette Kolmos, Lise Kofoed, Xiangyun Du and Astrid Lassen

Centre for Engineering Education Research and Development

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1. Introduction

'I like challenges in life and doing a PhD is a good challenge for me.'
- a PhD student

With the development of knowledge, society there is a need for qualified and efficient young researchers. Therefore, training of young researchers becomes an important task for universities as well as for national and European policymaking.

The establishment of Doctoral Schools, and by that a more organisational approach to quality assurance of the PhD-study and PhD-courses, is on a national level a rather new trend. However, Aalborg University, Faculty of Engineering, Science and Medicine established the International Doctoral School in the beginning of the 90's in order to address quality issues and establish profiles. During the last eight years special courses have been held for PhD-supervisors in order to develop awareness of the problematic issues that might occur during the supervision period, e.g. transition from undergraduate to post graduate study, change in working environment, working styles, intellectual status, academic confidence, and probably living style and self/esteem. This challenges influence supervision and it is important that students as well as supervisors do have a diverse range of coping strategies.

In Denmark, there is a lack of candidates applying for PhD scholarships within engineering. The salary level is much higher in industry and there is a general lack of qualified engineers. Therefore, the reputation of the quality of PhD training is a parameter in the competition for attracting the best candidates.

During the last five years, several Scandinavian and European reports have been published on a broad range of issues within this area, especially addressing the quality of the PhD programmes. However, research on the specific PhD supervision processes remains insufficient. Studies in UK show that supervisors' lack of attention to the PhD-students' process, confusion of roles and expectations are existing problems (Rugg and Petre, 2004; Delamont, Atkinson and Parry, 2004; Taylor and Beasley, 2005).

November 2005, an investigation was initiated by a group of researchers, PAU (Association for PhD-students), and the International Doctoral School at Faculty of Engineering, Science and Medicine, Aalborg University. This investigation has a general objective to uncover the experience with PhD supervision within the field of engineering from both a students' and supervisors' point of view. Especially, it aims to:

- obtain more knowledge about the current situation of PhD supervision;
- gain richer understanding of any possible difficulties that both PhD students and supervisors confront;
- identify any possibly existing or potential mismatch between PhD students and supervisors;

- provide suggestions on how to achieve efficient and helpful supervision in order to maximize the chances of success in completing PhD study on time.

This project is partly funded by the International Doctoral School, Faculty of Engineering, Science and Medicine, Aalborg University.

SurveyXact was used as the technical tool for the questionnaire survey. Provided by the Danish company Rambøll Management A/S, SurveyXact is an online tool for constructing and distributing web-based questionnaires. It is also used to collect and analyze the answers from these questionnaire-based surveys. Before sending out the questionnaire, it was pilot tested.

This survey is developed with inspiration from a survey conducted at Faculty of Natural Science, Aarhus University, (Ph.d.-vejledning ved Det Naturvidenskabelige Fakultet, 2005). The questionnaire has been developed by input from all parts in this investigation: PhD-students association, International Doctoral School and researchers. In March 2006 the questionnaire was sent out to respondents. The email addresses were obtained from International Doctoral School, which include a list of the registered active PhD students (399) and a list of employees who work as PhD supervisors (173).

The questionnaires were open for answering until middle of May. During this period, a reminder was sent to both groups of informants.

	Reply		No reply	
	N	%	N	%
PhD Students, N= 399	269	67%	130	33%
PhD supervisors, N= 173	113	65%	60	35%

Table 1: Response rates

The response rates of both surveys are pretty good as can be seen in table 1. For PhD students, it is 67%. 130 of the respondent did not reply, however, 45 emails were returned due to technical reasons and around 20 respondents sent email back explaining that they had finished their PhD projects by then. However, these numbers were not removed from the total number when calculating response rate.

The response rate of the survey for PhD supervisors is 65%. About 10 PhD supervisors sent email back to express their appreciation for this interesting and meaningful survey. Several supervisors sent email back to explain that they were too busy for this activity at the moment. Two people described their experiences on supervision through emails instead of answering the questionnaire. We mention this, because it indicates that the investigation was taken serious by the supervisors.

At the end of August 2006, preliminary results from the survey were presented during PAU's yearly meeting. Based on the results from the survey and the discussion with the

participants we made final decisions for the data collection methods, and in order to get some more coherent profiles of PhD-students we decided to conduct interviews.

During October and November 2006, we conducted ten interviews with PhD-students. Due to the results of the survey, showing that the PhD-students have a very high degree of satisfaction, this came was unexpected compared to our experience from discussion with PhD students. The PhD-students were chosen by random selection from a list of enrolled PhD students, but not all students would participate in interviews, either because they did not have the time or because they were so frustrated about their situation that they were unable to talk about it.

These interviews will be analysed in a follow-up report. Regarding this report on the questionnaire results, it is important to stress that half of the interviewed turned out to experience the PhD-study as problematic and very energy consuming. ¾ of these interviewees had not answered the questionnaire because they felt it was too demanding. This gives food for thought and sets the question mark: who are the non-respondent group in the survey. However, due to the high response rate the sample is still representative.

This report on the analysis of the survey data, investigating both PhD students and supervisors, is structured into four main chapters:
- introduction followed by the main conclusions and recommendations,
- presentation of the background factors for both response groups,
- supervision as it is approached and interpreted by both PhD students and supervisors,
- work conditions for PhD students.

For selected data, the Chi-Square test has been used to indicate level of significance. For each main chapter there will be a summary and concluding remarks.

Furthermore, it is worth noticing our criteria for the conclusions. In general, there is a very high percentage of satisfaction – about ¾ of the PhD students in this study are more or less satisfied with the conditions they have. On one hand, this percentage of satisfaction seems to be high – on the other hand, there is ¼ of the PhD students in this study who are not so satisfied, and who experience the study, supervision and work conditions as insufficient. This is every fourth or fifth PhD student, and out of 269 respondents this is about 52 – 67 PhD students who are not satisfied which is quite a lot. During our analysis we are trying to balance our interpretation of the data.

We could have continued to analyse data. We had to stop at a certain point. All questions are analysed according to their association with gender, national background and several questions are presented as cross-tabulations.

We hope you will enjoy your reading.

Anette Kolmos, Lise Busk Kofoed, Xiangyun Du and Astrid Lassen

2. Conclusion and recommendation

'This survey probably will take the statistics into account, and if the average rating is OK, probably nothing will be done. If there was a system that could look into the individual problems and situations then it could be of some help to those who need help most.' – a PhD student

This study is made in close cooperation between the International Doctoral School at the Faculty of Engineering, Science and Medicine, PAU (Association for PhD students) and engineering education researchers. Before starting this study we had some clear hypothesis of how it is to be a PhD student in year 2006. During several years, two of the authors had been running training courses and seminars on PhD supervision, which gave some interesting experiences. These experiences together with experiences from the PAU representatives and results from previous studies on PhD students' work conditions lead to the following notions:

- PhD students might feel it is difficult to approach the supervisors because they feel that their supervisors are too busy,
- That, especially for foreign PhD students, this might create a higher degree of difficulties to start as PhD student in Denmark,
- That supervision mainly focuses on scientific content and only to a minor degree takes personal issues into consideration,
- That there might occur conflicts in supervision – especially for relationships between PhD students and supervisors, who at the same time are the funding holders,.
- That the work load for PhD students is enormous,
- That the teaching load simply is too high for PhD students,
- That PhD students experience a high degree of loneliness and miss more social networking
- That the PhD students experience the working environment as stressful.
- That women might feel the PhD study even more challenging compared to their male colleagues.

These were some of our expectations which all witness that we expected a high degree of problems.

In order to analyse the supervision situation and PhD students work conditions we decided to send out questionnaires to both PhD students and PhD supervisors. The response rate is quite high, 67% of PhD students and 65% of supervisors. However, the question is: who answered? Follow-up interviews with 10 PhD students have shown that 7 out of the 10 interviewed PhD students have not answered the questionnaire because they have felt it would be too time consuming and were afraid that it would be too hard to reflect on their own situation. This is a typical problem with quantitative methods trying to catch social issues.

With the above reservations in mind, the findings from this study give another impression than we expected. At a general level, PhD students and supervisors are very much alike in their interpretation of the supervision situations and the quality of good supervision. It seems that the supervisors have a high degree of attention towards all kinds of supervision functions and roles. However, there are also quite a lot of tensions, and some of our predictions seem valid. These will be summarised in the following.

2.1 The background

We are dealing with an international environment. 40% of the PhD students and 20% of the supervisors come from abroad. 60% of the PhD-supervisors have international PhD-students - so the intercultural dimension is an issue.

We are also dealing with a rather mature group of PhD students. The main age group consist of respondents around 30 years old. Still, around 40% of the students are older than 30 years.

Furthermore, we know from the study that around 40 % of the PhD-students live on their own, 30% with a spouse and around 30% with spouse and children. So, not surprisingly, having old PhD-students also involves that these students have a lot of responsibilities in their private life and thus might need to organise the PhD-life in certain ways.

Compared to other PhD-investigations, the age and degree of PhD-students that have children are higher than expected. In the technical field, master students normally graduate on time and are therefore typically younger when they start their PhD-study.
These general observations show us that we are dealing with mature colleagues rather than students.

Most PhD students are from the department Electronic Systems. Women, however, are mainly employed at Health Technology, Biotechnology, Chemistry, but also departments as Development and Planning, Architecture and Design have more female than male PhD students.

There are three types of PhD scholarship funding: university funded, industry funded or a combination, and the most common is university funding. One fifth of the PhD students receive a scholarship partly funded by the industry, and a higher percentage of foreign PhD students belong to this category.

2.2 Supervision

The positive conclusions of the study are that, in general, PhD students and supervisors agree concerning the content of the supervision.

The type of response that PhD students think they receive is in accordance with the supervisor’s opinion. It primarily regards academic issues. However, supervisors think they give much more response to personal issues than the PhD students experience to get.

Giving response to personal issues is in accordance with the literature within this area stating that discussing personal issues is an important function of the supervision process.

There is also accordance between supervisors' and PhD students' view on the actual tasks in the supervision process, and reviewing thesis drafts, publishing and research planning are pointed out as the most dominant tasks.

PhD students are especially motivated by the objective of the projects, by publications and by sharing experiences. Supervisors nearly have the same ranking of issues. So, also in this case there is accordance between PhD students and supervisors. A gender perspective also exists as women receive motivation from participating in PhD courses. In general, many of the PhD students also get motivation from their supervisors.
When asking for the overall level of motivation one quarter of the students place themselves at the average point of a scale and one firth at the low or very low end of the scale. So, this leaves many students in a situation where more motivation is needed.

Production of publications and new knowledge are the two main expectations by supervisors to the PhD students, followed by a personal development process and finishing the study on time. Supervisors believe that these expectations to a high degree match the PhD students' expectations.

Supervisors feel a much higher degree of responsibility towards helping the PhD students finish their study than towards giving advice on future career choices. In general, the career aspect is not dominant at all in supervisors' practice, although employability has become part of the PhD studies , as not all candidates can remain employed in academia after finishing their study and have to find career options in industry. A surprisingly high percentage of PhD students are in their considerations on future careers oriented towards both academia and industry.

The PhD students also obtain other kinds of help from their supervisors. In general, a little less than half of the students answer that they get help with their involvement in teaching and course development as well as references. Furthermore, the planning of future employment is also a part of the supervisors' help. However, one fifth of the students do not experience this kind of help, so the question is whether future employment strategies, as well as support with teaching tasks, should be a central activity at the university.

Overall, the PhD students seem to agree with the supervisors about the quality of supervision. However, the PhD students judge the supervision practice at lower score compared to the ideal functions.

Still, there are also differences as supervisors rate the supervision process to be of a higher quality than the students. This is especially true for the topics: "providing direction to the PhD research" and "active involvement in the PhD project".

Scientific expertise and technical and practical competences are the aspects where students and supervisors have the highest level of agreement regarding quality. Further, the study shows that female PhD students need or expect more interaction with their supervisors than male PhD students do, and the international students prefer more technical and practical competences.

To the question about actual cooperation with supervisors it seems that whether PhD students have one or more than one supervisor the areas of cooperation in general are the same. The areas with the highest score are publishing, research planning and reviewing the thesis drafts. The supervisors rank the same three cooperation areas. Writing articles together with supervisors seems to be dominant for nearly all PhD students.

The more challenging issues in this study are that:

In general, PhD students are quite satisfied with their supervisor and many of the respondents have no problems. But one fifth of the students have experienced problems, and the female students have a higher score for this question – nearly one third of the women have problems, and it seems that more PhD students with supervisor as funding holder have problems compared to the students where the supervisor has been appointed in other ways.

Supervisors seem to be aware of problems in the supervision process, and more than half of the supervisors answer that they have experienced problems once in a while.

The problems, seen from the students' point of view, are lack of support with respect to technical competence and scientific expertise, mismatch in expectations, and lack of positive communication.

The problems, seen from the supervisors' point of view, are lack of progress in the PhD project, lack of efforts made by the PhD students, and mismatch in expectations. So, an important common point is mismatch of expectations where both parties have experienced problems. Being clear about expectations might solve other problems as well.

If the students have experienced problems these were to a high degree solved during meetings with their supervisor. But this study also shows that solving problems can take time and unfortunately some problems were not solved. In times of trouble there is also a tendency towards PhD students accepting the situation or changing supervisor, whereas some indicate that the PhD students have stopped.

Two-thirds of the PhD students are unaware of the possibility of choosing their own supervisor. More than half of the supervisors do not know this or thus do not think it is possibly for PhD students to choose their own supervisor. Consequently, there seems to be some uncertainties concerning this matter, and the rules for assigning supervisors should be made clearer.

During the last six years, the Doctoral School has recommended that more than one supervisor should be appointed in order to avoid problems in the communication between supervisors and PhD students. This study shows that this is not the case – a bit more than half of the PhD students do have two or more PhD supervisors. Therefore, the study cannot provide any evidence that students with two supervisors experience fewer communication problems than PhD students with only one supervisor.

About two thirds of the PhD students have regular meetings on a monthly basis, but still one third of the PhD students have fewer meetings than that. This might not be a problem, although it is worrying to see that nearly 20% of the PhD students indicate that meetings take place every 6 month or less frequent. One quarter of the PhD students also indicate that the frequency of meetings is too low.

2.3 Work conditions

In the chapter on work conditions, there is not the same degree of satisfaction compared to the chapter on supervision. The workload is high, and the PhD students feel a pressure as regards efficiency, and a huge part of them describe themselves as lonely.

It is a common preconception that women and foreign PhD students are working more. This study shows that this is not the case. If we calculate the average workload for PhD students it is close to 46 hours per week, which means that the majority of PhD students work more than the standard of 37 work hours per week. More than half of the PhD students at least work in half of their weekends and holidays – and 80% do it because of time pressure.

Half of the students find there is a fair balance between teaching and PhD work, but 80% also feel a time pressure, and almost one fifth answered that their teaching work is too much. Normally, what PhD students say is that teaching obligations are too time-consuming for them and they feel a tremendous time pressure.

In general student expresses a positive attitude towards their current work environment. The supervisors also have a clear opinion that the working environment is very important for the progress of the PhD project. International PhD students seem to be more satisfied than Danish students.

On a general level, PhD students are satisfied with a number of specific elements in their current working environment. One of the exceptions for this positive statement is the possibility of exchanging knowledge with colleagues, which is regarded very important for a good working environment by most PhD students.

Another question asked in connection to work environment concerns stress. More than half of the respondents experience the work environment to be stressful at different levels. No matter how the students understand stress it is a problem that 80% of the respondents feel a time pressure, and half of the students spend more than 41 hours a week on their work. Furthermore, almost a quarter of the students answer that they work during all or most weekends and holydays, and one third answer that they work half of the weekends

and holidays. So there is a reason for worries concerning stress- and stress related symptoms among PhD students. In this connection it is interesting that foreigners do consider the working environment to be less stressful compared to Danes.

Feeling lonely is also experienced as a problem as more than half of the students answer they have experienced loneliness, and interestingly more Danes than foreigners feel lonely. It is in the beginning that most of the students feel lonely, but a little more than a quarter feel it all the time, and the loneliness cause difficulties for almost half of the students. Lack of motivation and sadness, feeling tired, avoiding difficult issues and having difficulties with concentration are the most common difficulties connected to loneliness. Loneliness can also be seen as a problem causing stress. However, loneliness might be part of doing research, but when a little more than a quarter of the students feel loneliness all the time and when loneliness cause them severe difficulties then there are reasons to be very much aware of the PhD students' work environment.

2.4 Concluding remarks and recommendations

PhD students seem to have a high degree of satisfaction with the supervision in itself and the supervisors – even though there might be some problems. 2/3 of the PhD supervisors are willing to discuss supervision whereas 1/3 of the PhD supervisors probably do not want to join any activities. *We recommend that the Doctoral school continues to offer seminars and training courses for PhD supervisors. Especially, we recommend that there will be a greater variety of offers in the future: seminars for experienced supervisors, training workshops for younger PhD supervisors.*

The real problems occur in relation to the conditions for the PhD study. We expected to find that PhD students feel it is difficult to approach the supervisors, because they feel that their supervisors are too busy. The study finds that 1/3 of the PhD students have meetings with their supervisor less than once a month. This, combined with a very high average level for PhD supervisors' working hours per week, could indicate that there might be a general problem. However, only few of the PhD students have complained in this study. *A recommendation could be to set up yearly plans for supervision meetings. This should be an integrated part of the study plans.*

We expected to find that especially foreign PhD students experienced a higher degree of difficulties starting as PhD student in Denmark. Nevertheless, the results of the study do not present any indications that foreign PhD students face more difficulties than do Danish students – however, the study shows that foreign PhD students know less about the formal rules. *So a recommendation could be that the Doctoral School establish introduction courses to PhD students covering: the formal rules, PhD process, study skills and project management, introduction to what can be expected from supervision, writing process together with supervisors, rights as to choose own supervisor, having official meetings, etc.*

We expected that supervision i mainly focuses on scientific content and only to a minor degree takes personal issues into consideration. According to literature in the field personal issues are important to address. It can simply be to tell the PhD students that his or her work is good – and not always point out the negative aspects. *We recommend that these issues become part of activities for PhD supervisors and introduction courses for PhD students*

We expected conflicts in supervision to occur– especially for relationships between PhD students and supervisors that at the same time are the funding holders. We are surprised that not a higher percentage of PhD students have experienced problems in their relation to their supervisors. However, for those who have problems it might be an issue that the funding holder is also the supervisor. *Even if we cannot prove that two supervisors might reduce the level of problems, we will recommend that there will be appointed two supervisors.*

We expected to find that the work load for PhD students would be enormous, that the teaching load would simply be too high for PhD students, that PhD students would feel a high degree of loneliness and miss more social networking, and that the PhD students would perceive the working environment as stressful.

This study found that there is a high degree of workload, that the PhD students find the environment stressful, and that a large percentage of PhD students experience loneliness during their study. One way to reduce the level of stress is to speak about it and formulate clear expectations. *We recommend that this become part of the supervision process and that there might be an offer of consultancy for PhD students, where they can go and ask questions and discuss their problems.*

We expected a gender perspective – and there is a gender perspective. Firstly, women study in specific scientific areas; secondly, female PhD students seem to be less satisfied with their supervision situation than male colleagues do. This study cannot tell why women experience more problems and are less satisfied; however, it seems that special attention should be drawn to this aspect. *We recommend that these issues will be part of activities for supervisors and PhD students including consultancy.*

To sum up: In order to improve the situation among PhD students, we find evidence supporting the following suggestions:

- *introduction courses to PhD students,*
- *pedagogical training courses for PhD students*
- *various activities for supervisors,*
- *establishment of consultancy for PhD students*
- *career advise to PhD students.*

3. Respondent groups

This chapter introduces the backgrounds characteristics of the two groups of respondents in the survey. During the analysis of the data we will return to these background factors wherever we have found results that are relevant to present. In general, we have analysed all our data with respect to the possible effect of gender and nationality.

3.1 Gender and age

	Men		Women	
	N	%	N	%
PhD students	203	74%	71	26%
PhD supervisors	107	92%	10	8%

Table 3.1 Respondents by gender

Table 3.1 shows the respondents' gender. There are 1/4 women PhD students (both Danish and foreign PhD students) and only less than 10 % of women PhD supervisors.

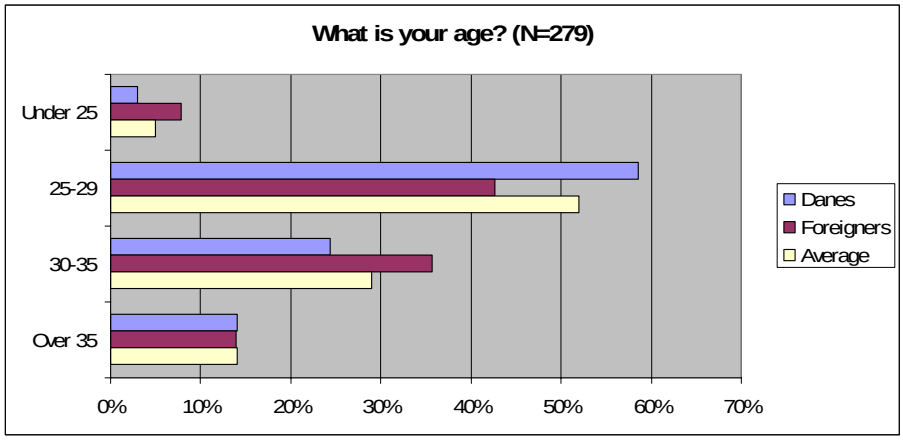

Figure 3.1 Respondent information by age.

Figure 3.1 presents the age of the PhD students in this study. On average, more than half (nearly 80%) of the PhD students are between the age of 25 and 35, and around 43% are more than 30 years old. These results show that it is a rather mature group of PhD students at the faculty.

Within the group of foreign PhD students there seem to be a greater variation in terms of age compared to the group of Danish PhD students, and on an average foreign PhD students are older than Danish PhD students.

PhD supervisors, N=118	%
30-40 years	22%
41-50 years	41%
51-60 years	25%
< 60 years	12%
Total	100%

Table 3.2 PhD supervisors by age

The age span of the responding PhD supervisors differs from 30 to more than 60, with a majority of PhD supervisors in their 40'ties.

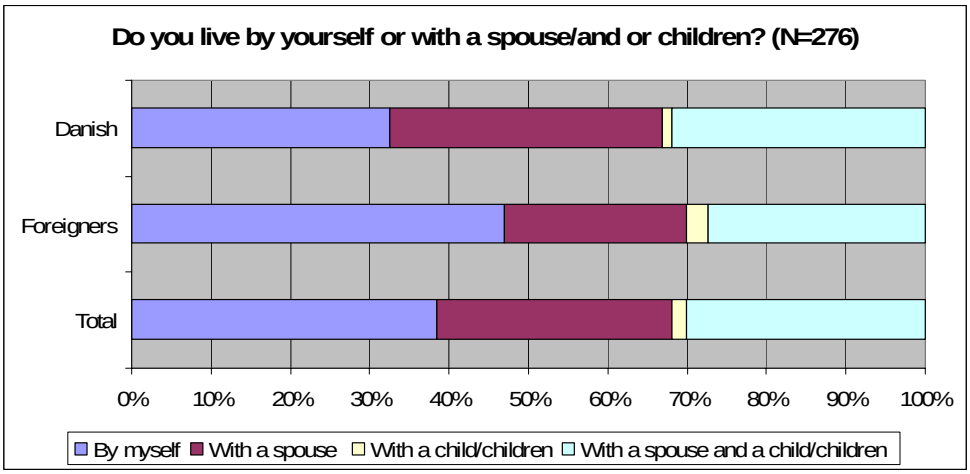

Figure 3.2: Family situation for international and Danish PhD students.

Figure 3.2 shows that around 30% of the PhD students live with spouse and children, 30% with a spouse only, and the rest live on their own. So, not surprisingly, having old PhD-students also involves that these students have a lot of responsibilities in their private life and thus might need to organise their PhD-life in a certain way.

It is especially Danish female PhD students who are living with spouse and who have kids. Looking at the figures for foreign PhD students in figure 3.2 one see that they live alone more often than Danish students do, although it is quite surprising that also 30% of them live with spouse and children.

Compared to other PhD-investigations, the age and the number of PhD-students that have children are higher than expected. In the technical field master students normally graduate on time and they are therefore typically younger when they start their PhD-study.

The PhD students vary in how far along they are in their study.

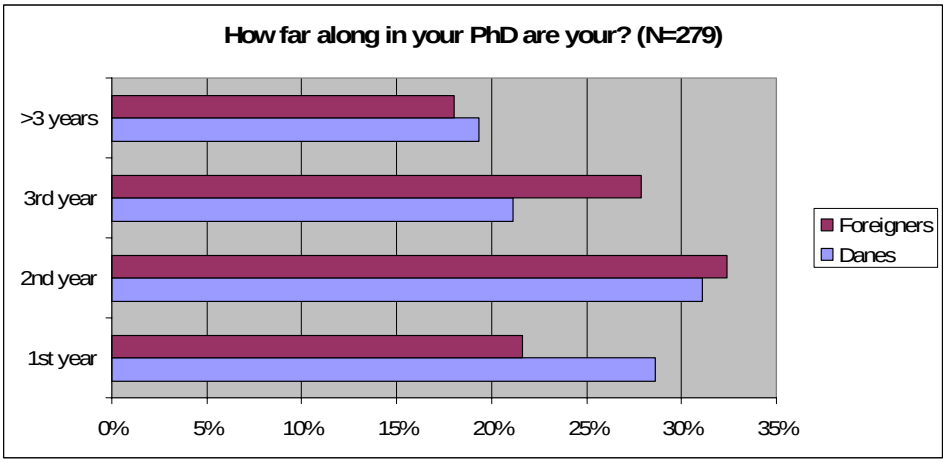

Figure 3.3: Study year.

Figure 3.3 shows how far along the PhD students are in their study. On average, 26% are in their first year of their project, 31% are in the second year, 24% are in the third year and 19% have been working on their project for more than 3 years. So, all stages in the process are represented in the study. It is problematic, though, that nearly one fifth of the PhD students have used more than 3 years (3 years is the normal length of a PhD scholarship). We expected a higher percentage of foreign PhD to finish on time, but the number of students exceeding the three years seems to be the same for both Danish and foreign PhD students.

3.2 Nationality

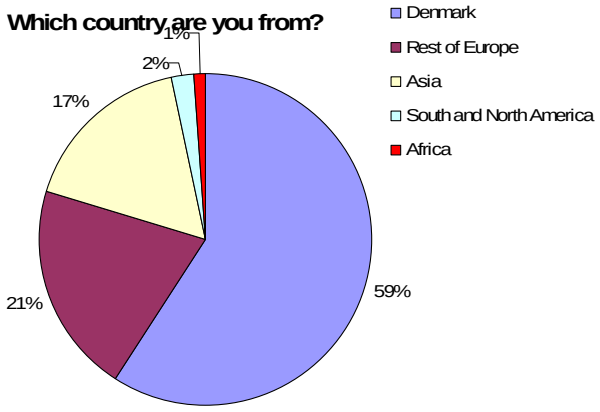

Figure 3.4: Nationality.

Figure 3.4 shows information about the students' nationality. Around 60 % of the PhD students are from Denmark and 40% are from abroad. Compared to other Danish Doctoral Schools, this is a rather high percentage of PhD students coming from abroad.

If we compare to the general figures from the International Doctoral School, 35% are from abroad. This means that in this investigation there is a slight overrepresentation of international PhD students.

Further, a rather high percentage of PhD supervisors are from outside Denmark. Around 20% are from abroad. This gives a very international environment and the study shows that more than 50% of the supervisors have PhD students with both national and international background.

3.3 Subject area and type of scholarship

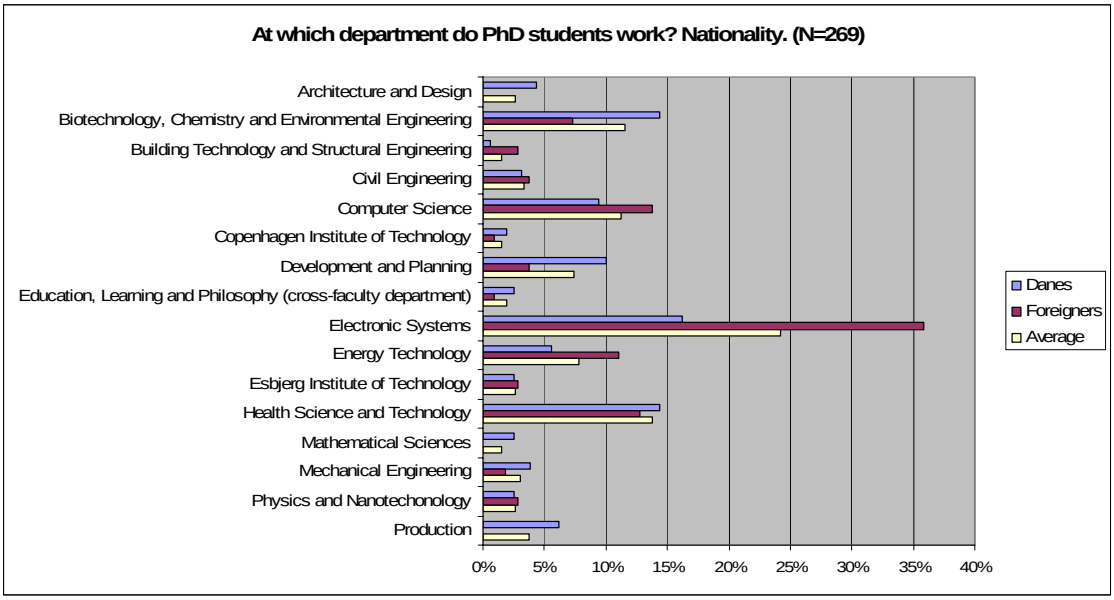

Figure 3.5: Department and national background for PhD students.

Figure 3.5 introduces information on which department within the Faculty of Engineering, Science and Medicine the PhD students are currently situated in. As the figure shows, PhD students are from all the 16 different departments at Faculty of Engineering, Science and Medicine in spring of 2006, though mainly from Electronic Systems. As figure 3.5 shows Electronic Systems does have more international PhD students than other departments.

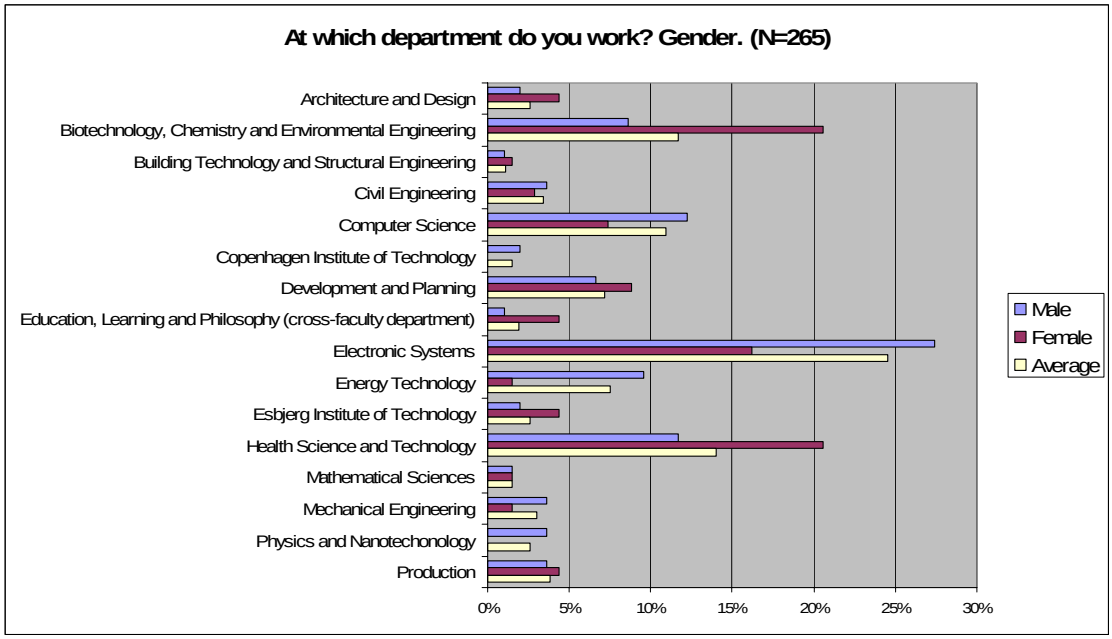

Figure 3.6: Department and gender for PhD students.

Figure 3.6 shows that there is a traditional gender perspective. Although all around represented, women are foremost to be found at health technology and biotechnology, chemistry and environmental engineering. This distribution corresponds to where the most female engineers are educated.

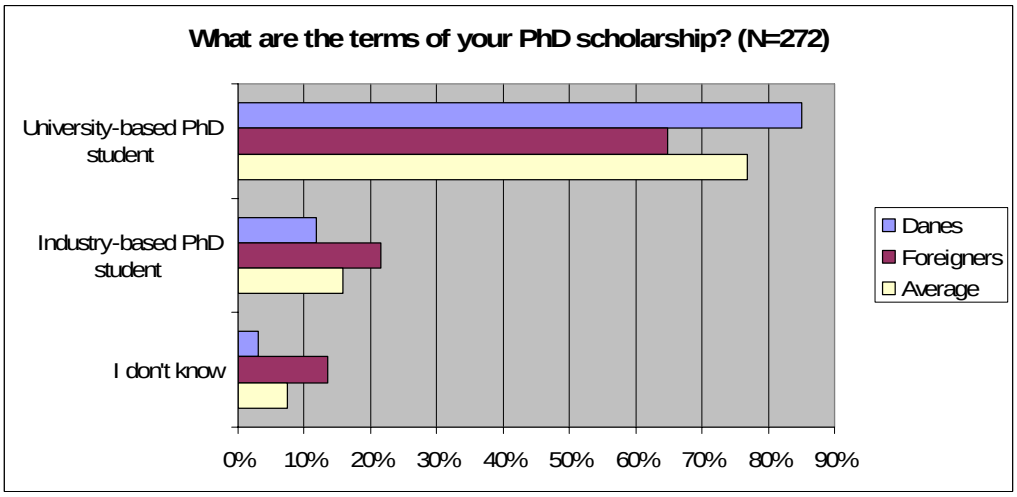

Figure 3.7: PhD students by terms of scholarship. Nationality.

There are different sources for the funding of scholarships. Typically, scholarships are funded by public resources; however, for many years it has been possible to have co-funded scholarships by industry or full industry funded projects. Normally, it is the supervisors that have applied for the funding, and as funding holders they become

supervisors. However, this can create a problematic situation if the student and supervisor do not get along very well.

Figure 3.7 illustrates the two main types of scholarship for PhD projects according to nationality. Not all PhD students are aware of how their scholarship is funded. three-quarters of the PhD students state they are funded by the university 15% by industry, and the remaining 8% do not know. Concerning the international aspect – a higher percentage of foreign PhD students than Danish students indicate that they have industry based PhD scholarship[1].

According to figures from the International Doctoral School 21% of all PhD-students are industry based – by full funding, co-funding or an extensive cooperation with industry. This aspect calls for attention when nearly one fifth of the current PhD students receive their scholarship partly from industry, and nearly half of the current PhD supervisors supervise students with industry-funded scholarships.

3.4 Summary

We are dealing with international environments in which supervision take place. There are various international traditions and expectations for writing a PhD thesis. In some cultures it is expected that PhD students more or less are research assistants to professors, in other cultures it is expected that PhD students work independently. At Aalborg University, there are a lot of chances for meeting these challenges.

The study shows that almost half of the students come from countries outside Denmark, which might be an extra challenge for the supervisors, but also many supervisors are from countries outside Denmark. Furthermore, the age of the students indicates that we are dealing with rather mature students, which is reflected in their family situation. Almost one third of the PhD students have a family: spouse and children, and almost one third live with a spouse, so more than half of the PhD students have obligations in their private life, which might have an impact on their work situation, both positive as well as negative.

The study also shows that there is a gender aspect to consider. ¼ of the PhD students are women, but less than 10% of the supervisors are women..

Most PhD students are from the department of Electronic Systems, but this is not reflected in the percentage of female PhD students at this department. Instead, the female students are employed at Health Technology, Biotechnology, Chemistry, as well as departments as Development and Planning, Architecture and Design have more female than male PhD students.

There are three types of PhD scholarship funding: university funded, industry funded or a combination, and the most common is university funding. But one fifth of the PhD students receive their scholarship partly funded from industry, and a higher percentage of foreign PhD students belong to this category. This can be another challenge for both the

[1] The correlation is significant at the 0.001 level.

PhD student as well as for the supervisor. The responsibility is directed towards both the funding enterprise as well as the research environment.

Again, there are challenges for both PhD students and their supervisors at many levels.

4. Supervision

'When I look back, if I can have a chance to do it all over again, I will do it in a different way. I will take more responsibility in ensuring regular meetings with my supervisors. If I could have been told about these rights before, I would have been in a very different way…'
- a PhD student

4.1 Background

Many supervisors are appointed because they are the funding holders. This means that the PhD student might not have a free choice of supervisor whereas the supervisors have a choice of PhD student in the selection process. If any "chemistry" or other social problems occur between the student and the supervisor it might get complicated, because the funding and the connected responsibilities are the supervisors responsibility.

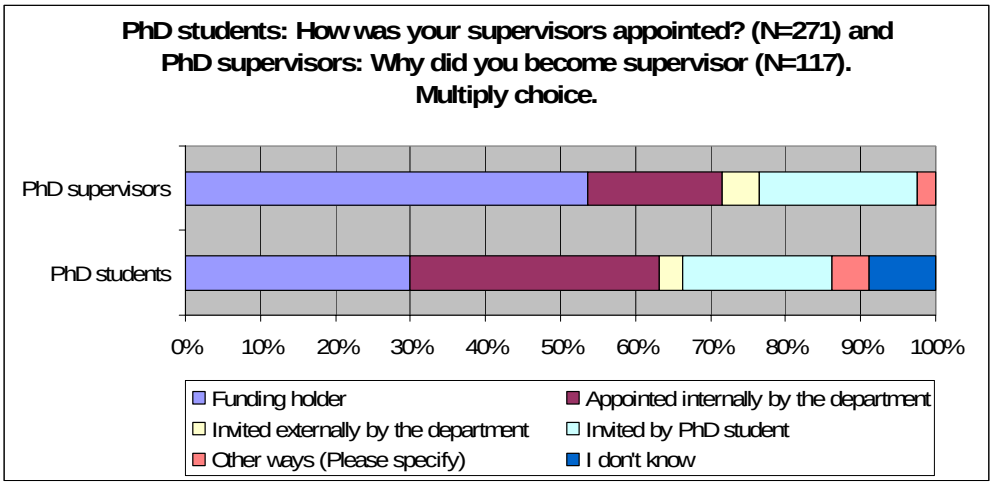

Figure 4.1: Ways of appointing supervisors. Multiply choice, PhD students: 317 answers, PhD supervisors: 198 answers.

Figure 4.1 shows different ways of establishing PhD supervision relationship. Nearly one third of the PhD students answer that their supervisors were appointed because they are funding holders; one third of the supervisors were appointed internally by the department; and only 20% of the students invited their supervisors themselves. More foreign PhD students than Danish PhD students answered that supervisors were appointments by the department and a higher percentage of foreign student also answered 'I do not know' Their situation is also different, as they do not know anybody when they arrive whereas the Danish students may have finished their master at the same department.

Answers from PhD supervisors show different result: more than half of them became supervisors because they are funding holders. The rest of the supervisors had other reasons.

The results indicate that PhD students are unaware of the possibility to choose their own supervisor.

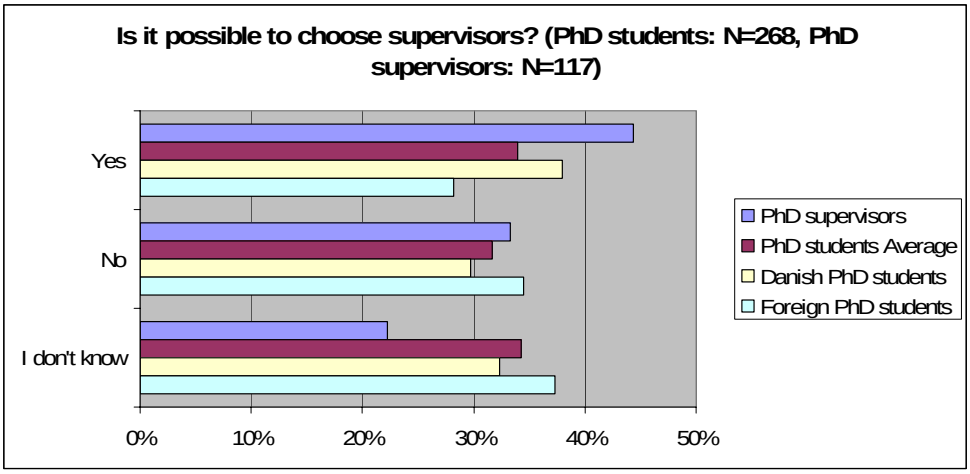

Figure 4.2 Possibility of choosing supervisor at the department. Comparison of PhD students and PhD supervisors answers. Comparison of two frequency analysis: national background (Danes and Foreigners) and PhD supervisors.

Figure 4.2 shows that two thirds of the PhD students do not know it is possible, or they do not think it is possible, to choose their own supervisor. Nearly half of the supervisors answer that it is possible for PhD students to choose supervisors, 1/3 of them replied that it is not possible for PhD students to choose supervisors, and 1/5 of them did not know whether the students had the possibility or not. The difference between Danish and foreign students is not statistically significant,[2] so the surprising result is that such a high percentage of the students answer "no" and "I do not know".

As a way to prevent conflicts, the International Doctoral School recommends that two supervisors be appointed. This can be a solution to the funding holder problem; however, it might create other problems if the two supervisors do not have a very clear agreement on how to share the supervision workload.

	N	Percentage
1 supervisor	119	44%
2 supervisors	121	45%
> 2 supervisors	30	11%
Total	270	100%

Table 4.1: Numbers of supervisors

However, table 4.1 shows that a bit more than half of the PhD students do have two or more supervisors.

[2] *The correlation is *not* significant at the 0.05 level.

	N	Percentage
Yes, all of them	48	41 %
Yes, some are from Denmark, but some are from other countries	50	43 %
No, they are all from other countries	19	16 %
Total	117	100 %

Table 4.2 Intercultural situation in PhD supervision, PhD supervisors.

To the question 'Is/are your PhD student(s) from Denmark?', in the questionnaire for supervisors, table 4.2 shows that at least 60% of all the supervisors are attached to an international PhD student. This means that intercultural communication in PhD supervision is an important aspect that needs to be taken into consideration of both parties.

4.2 Meetings

The majority of PhD students has weekly face to face and email contact with their supervisors. Telephone contact is used more seldom.

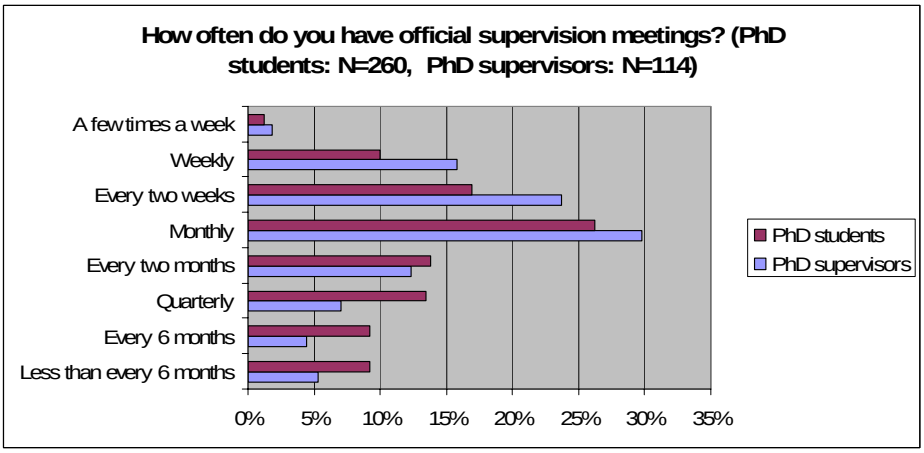

Figure 4.3: Official meeting in PhD supervision

Concerning official meetings, as shown in figure 4.3, PhD supervisors experience to have meetings more often than PhD students do[3]. On average, about two thirds of the PhD students have official supervision meetings on a monthly basis or more often than that, according to the supervisors.

Table 4.3 and 4.4 show whether PhD students and supervisors think there is enough official meetings.

[3] *The correlation is significant at the 0.01 level

	N	%
Too little	63	24 %
Suitable	174	66 %
Too much	1	0 %
I don't know	24	9 %
Total	262	100 %

Table 4.3: Do you think that they have enough official meetings? PhD student.

A quarter of the PhD students do not think the number of official PhD meetings are enough, but at the same time two thirds of the PhD students are satisfied.

	N	%
Yes, it should be enough for students because they are expected to conduct the PhD research independently	53	50 %
It seems enough because I seldom hear complaints	38	36 %
It might not be enough, but I am too busy to provide more	15	14 %
No, I don't think that it is enough, but I am only paid for a limited amount of hours	3	3 %
Others	24	23 %
Total	106	

Table 4.4: Do you think that your PhD students do have enough official meetings? PhD supervisors. Multiply choice.

More than 80% of the supervisors think the number of supervision meetings is sufficient. More than one third thinks that no news is good news. 14% of the supervisors say that it might not be enough, but that they cannot offer more because of the pressure of their own workload, and only very few answer that the insufficient number of meeting results from a limited number of paid supervision hours.

Supervisors' comments to this question definitely show that the supervisors expect the PhD-students to be active and initiate meetings:

- *'It depends on the student'*
- *'I expect my PhD students to ask for meetings and request the supervision they need.'*
- *'It is very dependent on the student and in which phase of the PhD project he/she is in'*
- *'The initiative for meetings should come from the students'*
- *'If more is needed, they get more'*
- *'Yes, the research is performed as part of a team with regular contact'*
- *'Jointly supervised students resident in Norway'*
- *'I have almost daily contact with my students, and that does not make them independent.'*

- *'Enough - they can schedule all the meetings they want.'*
- *'If there is need for meeting, we arrange a meeting'*

But there is also a variation in the needs for supervision:

- *'The need varies very much depending on the personality'*
- *'I believe at the beginning of the PhD some more supervision time is required. Once the PhD is set on track supervision Can be a bit reduced'*
- *'Is enough for most - one may need a bit more. But the work plans can be outlined to fit meetings every 2-3 weeks.'*

4.3 Type of response, cooperation and motivation

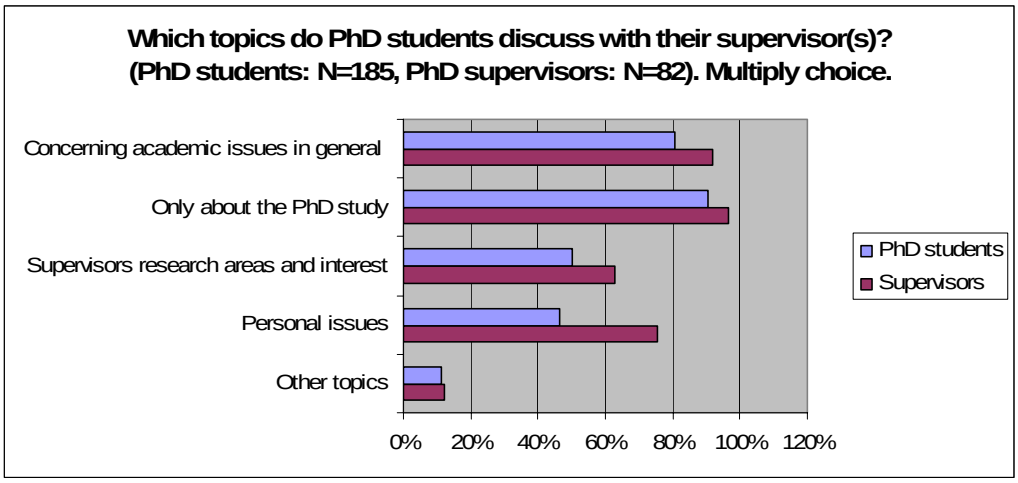

Figure 4.4: Topics at the meeting. Multiply choice. PhD students and supervisors.

Figure 4.4 presents the topics discussed in the communication between PhD students and their supervisors, based on a multiple-choice question found in both questionnaires. PhD students and supervisors answer very similarly. The most dominant communication topics are the PhD study and academic issues in general. The only real difference is that supervisors to a much higher degree think that they discuss personal issues than the PhD student's experience[4]. All literature in this field stress the importance of discussing personal issues, so the results indicate that this is on the agenda for most supervisors, but it is not reflected in how PhD students experience the communication about personal issues.

We also asked PhD students what their actual cooperation with supervisors consist of. Some of the PhD students have several supervisors – and it was possible to answer the question for each particular supervisor. The results are shown in table 4.5, sorted by the highest ranking topics for supervisor 1.

[4] *The correlation is significant at the 0.01 level.

	Supervisor 1		Supervisor 2		Supervisor 3	
	N	%	N	%	N	%
Publishing	197	76 %	81	58 %	16	55 %
Research planning and reviewing	184	71 %	89	64 %	12	41 %
Reviewing thesis drafts	157	61 %	73	52 %	11	38 %
Conference participation	114	44 %	48	34 %	8	28 %
Networking	97	38 %	46	33 %	9	31 %
Gathering literature	80	31 %	44	31 %	7	24 %
Teaching	72	28 %	31	22 %	5	17 %
Laboratory work	60	23 %	42	30 %	7	24 %
Organizing and evaluating training	25	10 %	16	11 %	6	21 %
Other (please specify)	17	7 %	8	6 %	2	7 %
Total	258		140		29	

Table 4.5 PhD students: What does your cooperation with your supervisor(s) consist of? Multiply choice.

The results show that the main cooperation with all the supervisors is:

- Publishing
- Research planning and reviewing
- Reviewing thesis drafts

To this question the main supervisors score higher compared to the two other supervisors.

The same question has been asked to PhD-supervisors.

To which degree does your cooperation with your PhD student(s) consist of? (scale: 1 for "to a very low degree" and 5 for "to a very high degree") (N=115). Multiple choice.

	1	2	3	4	5	I don't know	Average Scale
Reviewing thesis drafts	0 %	4 %	11 %	37 %	46 %	2 %	4,3
Research planning and reviewing	0 %	4 %	11 %	42 %	43 %	1 %	4,2
Publishing	2 %	6 %	17 %	35 %	38 %	2 %	4,0
Networking	4 %	11 %	37 %	40 %	7 %	2 %	3,3
Conference participation	10 %	12 %	32 %	34 %	10 %	2 %	3,2
Organizing and evaluating training	10 %	30 %	30 %	17 %	4 %	10 %	2,7
Teaching	15 %	34 %	31 %	18 %	1 %	1 %	2,6

Laboratory work	27 %	25 %	24 %	13 %	5 %	5 %	2,4
Collecting literature	4 %	32 %	34 %	27 %	2 %	1 %	2,9

Table 4.6 PhD supervisors: To which degree does your cooperation with your PhD student(s) consist of? Multiply choice.

Actually, the supervisors rank the same three factors highest but in a different order. For supervisors the ranking is:

- Reviewing thesis drafts
- Research planning and reviewing
- Publishing

These results are not surprising as supervisors are publishing much more than just the work together with PhD students. But it is quite surprising that such a high percentage of PhD students cooperate with their supervisors on publishing. This is worth noticing – especially because it is a practice at some departments that PhD students deliver a monograph instead of a collection of several publications. Even if the top management at the university support the strategy to write articles and publish them during the PhD period, it might be difficult for certain research areas to follow that strategy due to the subject area and the publishing traditions.

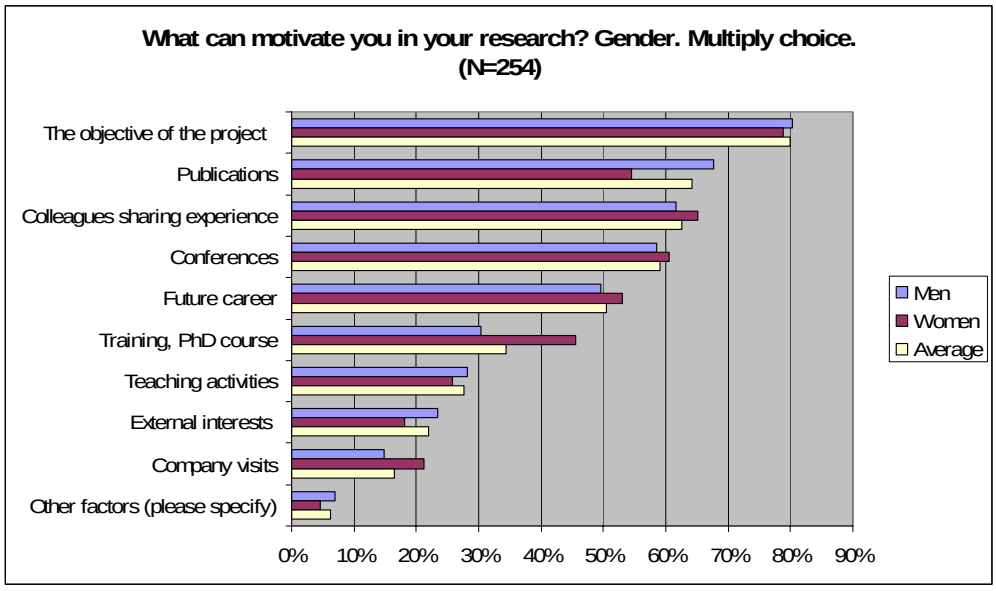

Figure 4.5: Motivation of PhD students in their research. Gender.

The average results about PhD student's motivation give the following ranking of factors that scored more than 50%.

- the objective of the project,
- publications,
- colleagues sharing experiences
- conferences
- future career.

Concerning the gender perspective men and women differ within the factor: PhD course and training[5]. Furthermore, the intercultural dimension is especially dominant for the factor 'future career' where 63% of the foreign PhD students indicate this as a motivation factor compared to only 43% of the Danish PhD students

Similar question was asked to the supervisors, and their responses are very similar. Supervisors' answers show that they agree with the PhD Students' priorities. The ranking of the factors are almost the same:

- the objective of the project,
- publications,
- conferences,
- colleagues sharing experience,
- future career,
- external interests
- company visits
- training and PhD courses
- teaching activities.

So it seems that there is a great harmony between the two groups. Furthermore, the opinion on what may motivate the students during the PhD process is in accordance with their cooperation practice as shown in figure 4.5 and 4.6.

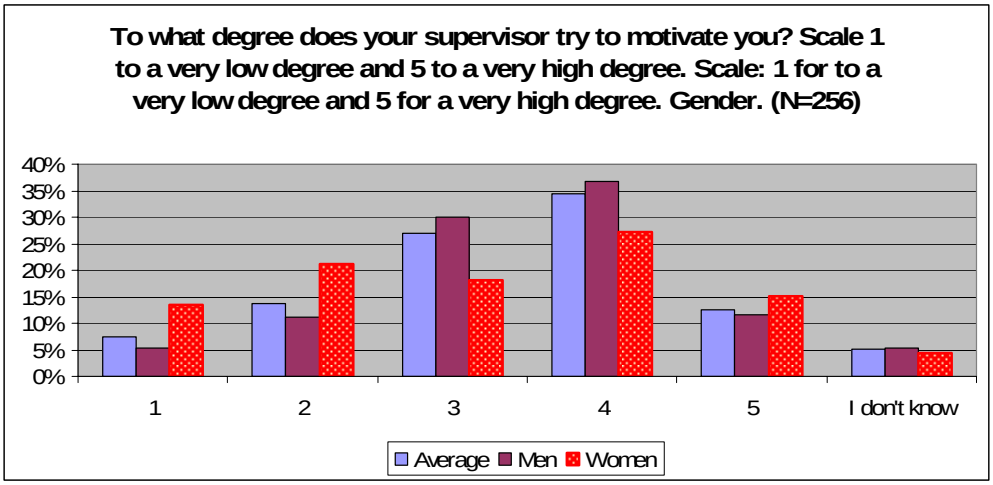

Figure 4.6: Motivation from supervisors in the PhD study. Gender.

Figure 4.6 illustrates how PhD students in general experience that the supervisors motivate them. In general, about half of the 256 respondents chose a higher scale than 3, which means that many of them experience that their supervisors try to motivate them, but still a quarter of the PhD students indicates that they lack motivation from their supervisor, which might cause problems for the students. However, there is a gender dimension as women to a great extent rate the

[5]* The correlation is significant at the 0.05 level.

motivation from their supervisor at the low or high end of the scale whereas their male colleagues rate the motivation at the middle of the scale[6].

4.4 Expectations and responsibility

This section presents the survey's results on PhD supervisors' expectations to the outcome of PhD research, on the PhD supervisors' responsibilities and their suggestions for improvement of the PhD supervision.

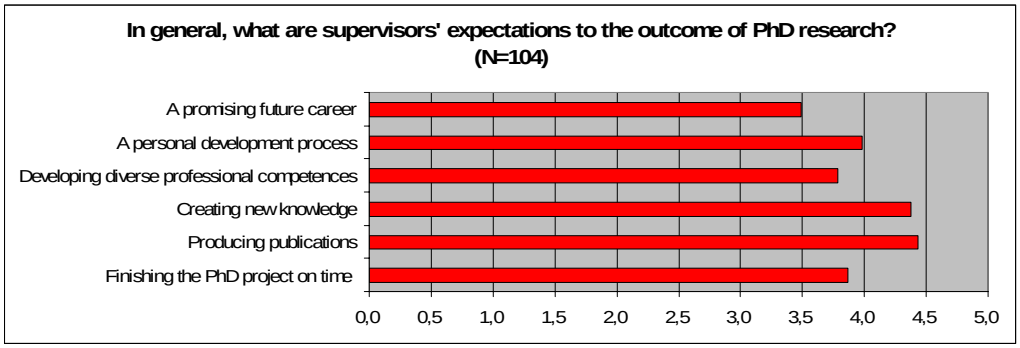

Figure 4.7: Supervisors' expectations to the outcome of PhD research.

Figure 4.7 presents the PhD supervisors' general expectations to the outcome of PhD research. On average, the supervisors rate the different factors higher than 3.5 on the scale, which means that in general, all the six outcomes are rather highly expected by PhD supervisors. In particular, the factors of 'Producing publications' and 'Creating new knowledge' are regarded as the most important outcomes of the PhD research.

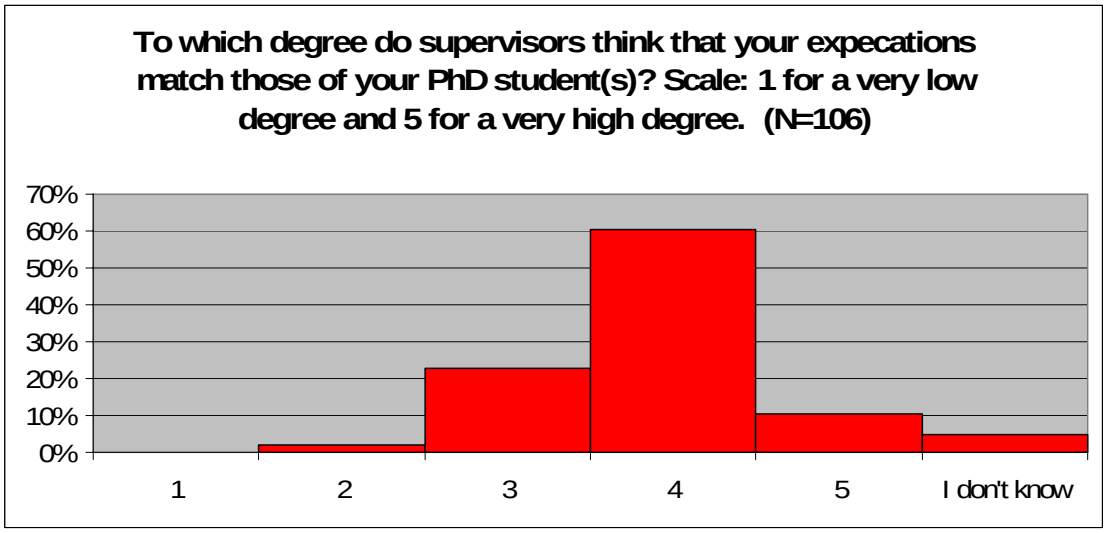

Figure 4.8 To which degree do PhD supervisors think their expectations matching PhD students' expectations?

[6]* The correlation is significant at the 0.05 level.

Figure 4.8 illustrates to which degree PhD supervisors think that their expectations match those of the PhD students'. Among the 106 respondents to this question, 70% of the supervisors think that the expectations are the same to a high or a very high degree. Nearly nobody say to a low degree.

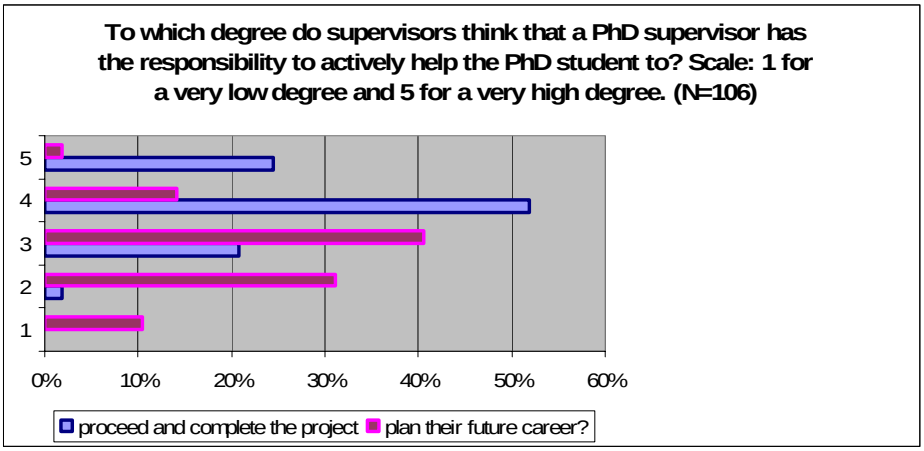

Figure 4.9 PhD supervisors' opinion on their responsibility to help PhD student proceed and complete the PhD project and to planning future career.

Figure 4.9 illustrates to which degree supervisors think that a PhD supervisor has the responsibility to actively help the PhD students proceed and complete the PhD project.
The answers illustrate that supervisors feel a high responsibility for the PhD students and for helping them finish the project. Here we should not forget that many supervisors are funding holders, so they have a clear interest in a final completed product.

Concerning the responsibility to actively help the PhD students planning their future career the majority of supervisors feel a low degree of the responsibility. Still half of the supervisors chose higher scale 3, 4 and 5 meaning that they feel a certain responsibility.

4.5 Future career and supervision

Future career is a motivation factor although it is not the most dominant factor. In international literature, employability plans after the PhD studies have become an important issue partly to relate research to industry and society, partly to set up career path to both industry and academia. Figure 4.10 illustrates PhD students' future plans in terms of where they intend to work after the PhD study.

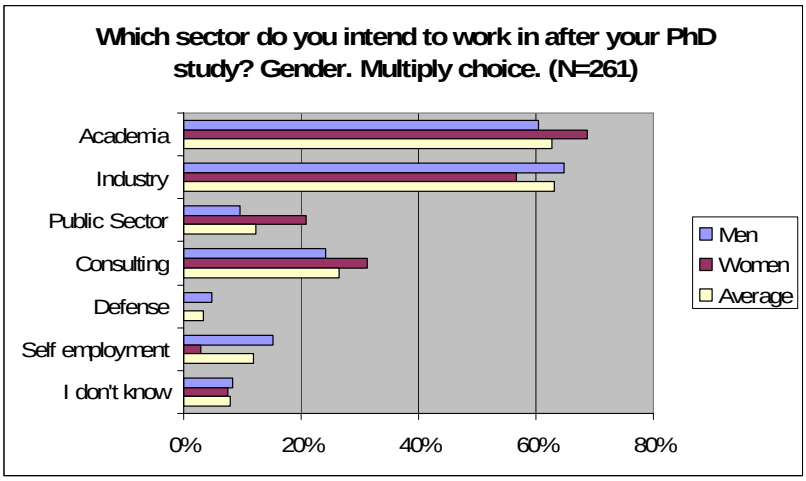

Figure 4.10 PhD students' future plans. Gender. Multiple choice.

Among the 261 respondents to this multiple-choice question an equal percentage of PhD students chose academia and industry. Only a lower percentage of students chose the public sector and consulting. This result is quite impressive especially that 63% of the respondents consider academia and industry equally. There is the traditional gender variation as women are more oriented toward the public sector than their male colleagues are and a higher frequency of male students plan for self employment[7].

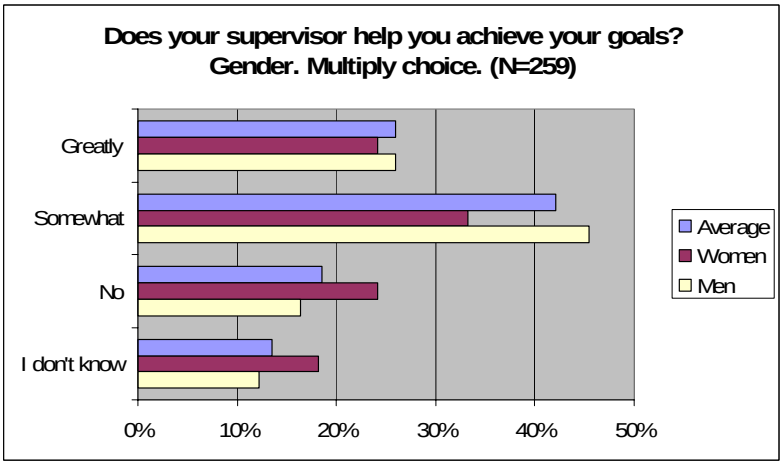

Figure 4.11: Does/Do your supervisor(s) help you achieve your goal(s)? Gender.

Figure 4.11: shows whether and to what degree the PhD students feel that their supervisors help them to achieve their goals. In general, about two thirds of the respondents feel that their supervisors to various degrees help them to achieve their goals, but about one fifth of the students get no help at all in this regard. At first glance there seems to be a gender dimension to this question, however, there are no significant

[7]* The correlation between gender and employment in the public sector is significant at the 0.05 level and the correlation between gender and self employment is significant at the 0.01 level.

differences between male and female students and their experience of support in terms of goal attainment[8].

The function as counsellor in regard to further career plans might be quite new to some supervisors. As the development goes on, there will be more and more PhD students that needs advise for their future careers. This does not mean that we gone from an elite perspective to a mass education perspective, but it means that not all PhD students will find their future career in academia and that Doctoral Schools have to think in broader terms of qualification strategies.

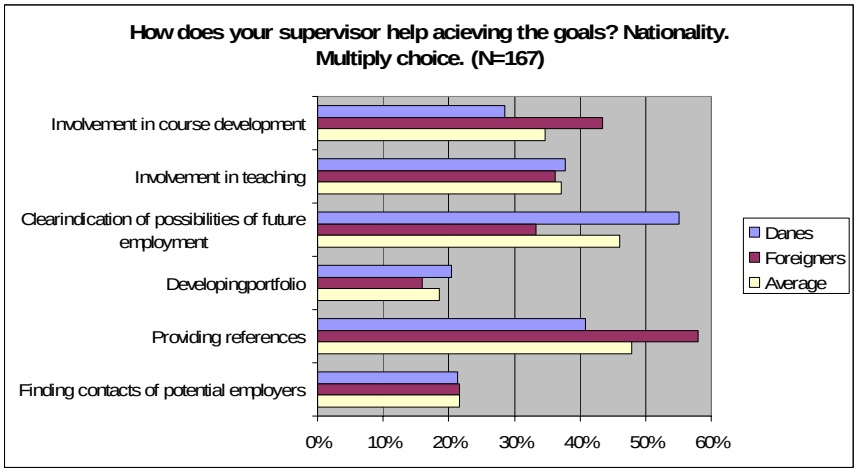

Figure 4.12: Ways of supervisor's help with achieving the goals. Nationality.

Figure 4.12 illustrates in which aspects PhD students get help from their supervisors in terms of achieving their goals. Among the 167 respondents of this multiple-choice question, the result is that providing references and indication of possibilities of future employment are the two ways supervisors mainly offer support. Little less than 50% of the PhD supervisors provide help with future employment possibilities, and about 20% help finding contacts of potential employers. About one third of the supervisors give help with course development and teaching. There is a clear difference in the response from Danes and Foreigners. Danes experiences they get more help according possibilities of future employment, and Foreign PhD students concerning involvement in course development. Foreign students also appreciate the help they get for providing references.

4.6 The overall quality of supervision

This section presents how PhD students and supervisors perceive the qualities of good supervision and what the cooperation between supervisors and PhD students consists of.

[8]* The correlation is *not* significant at the 0.05 level – this may however result from the low number of female PhD students (n=54), who have answered this question.

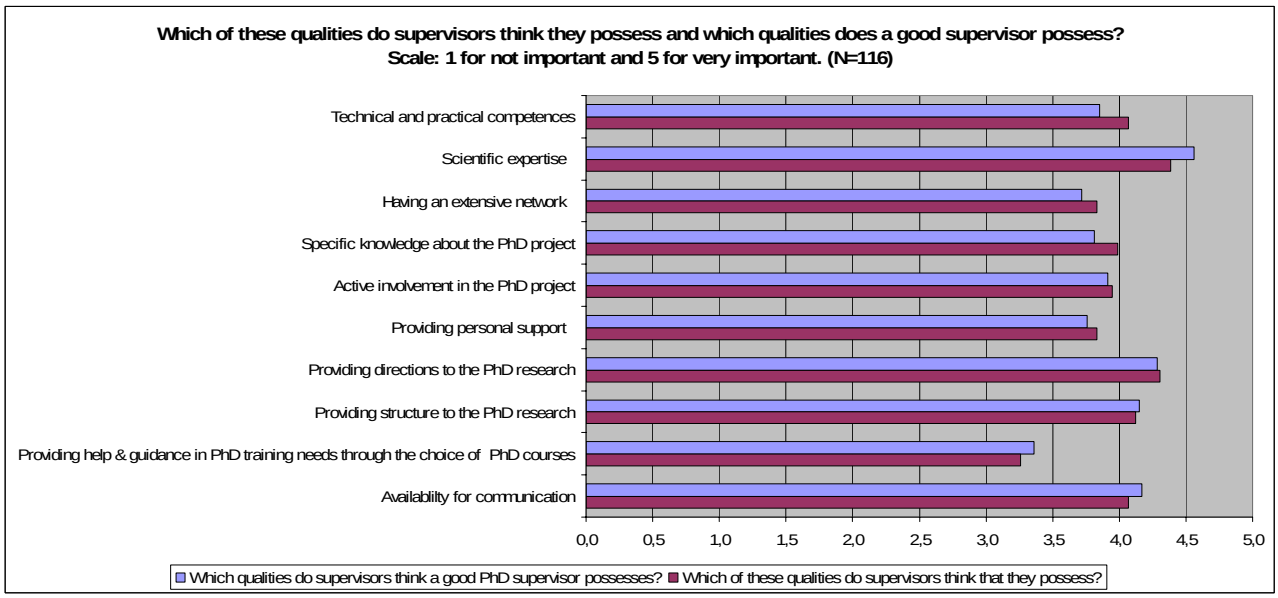

Figure 4.13: Supervisors' opinion of a good supervisor.

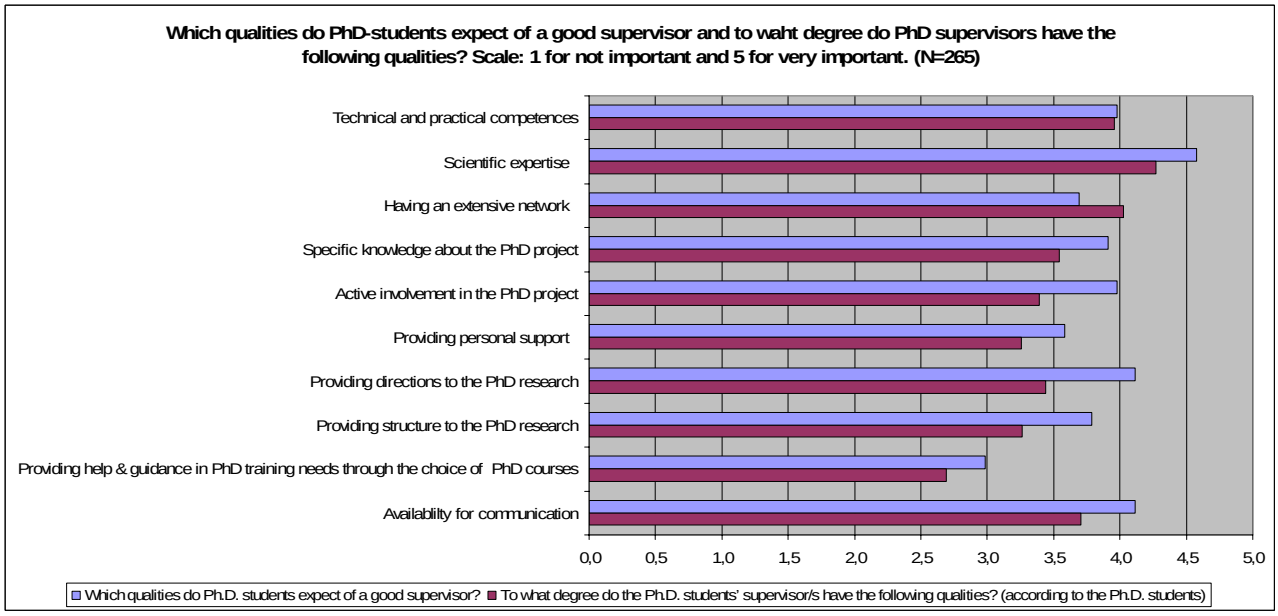

Figure 4.14: PhD students' opinion of a good supervisor.

Figure 4.13 and 4.14 illustrate qualities of good supervision in general in the opinions of both PhD supervisors and PhD students compared to the qualities the PhD supervisors think they possess and to the qualities PhD students think that their supervisors possess.

In general, these two figures show:

- In general, there is a high level of satisfaction with the supervision and with the qualities PhD supervisors think they possess.

- for the supervisors there is a high degree of concordant between what they think supervisors should possess and what they experience to possess.
- for the PhD students there are minor differences between what they think their supervisors possess of good qualities and their criteria for good supervision, especially for the three factors providing structure to the PhD research, providing direction to the PhD research and active involvement in the PhD project. Therefore, it seems that PhD students wish to have more active response to "structure and direction" and an "active involvement from the supervisors".
- all factors are scoring more or less the same, although scientific expertise is the top factor of good quality supervision for both students and supervisors.

To the question 'Which qualities do you think a good PhD supervisor possesses?' 11 PhD supervisors and 23 PhD students supplemented their response. These comments have been analysed in order to define additional qualities. We have chosen some of the comments to illustrate these qualities:

Additional qualities	PhD supervisors	PhD students
Fund raiser and administration	*'Provide funding for cost of experiments. Roughly equivalent to the cost of the PhD stipend in my research area.'* *'Provide well-functioning lab facilities (equipment) .'*	*'Administrative help'.* *'Knowledge of the rules and conditions that apply at Aalborg University (i.e. how many ECTS points are needed, is a stay in another lab a requirement etc).'*
Motivator	*'Keep up the students' motivation.'* *'Ensure transfer of project ownership to the student.'* *'You can show the horse where to drink, but you can not force it to drink. Self motivation is a must for a PhD student. They should be in the driver seat of the Car. I am holding the map, and providing instructions.'*	*'I feel very happy with my supervisor, I have totally freedom to do and plan my work, and I just come to him when I am stock somewhere. I like that I can work in what I want and what I need and not in things that he things are appropriate. I don't like to be told what to do -and I don't need anyone to do so- so I feel very satisfy with him.'* *'Be interested in what I do.'* *'Supervisors must be supportive to students; they should not 'peck' on students. The working relationship should be co-operative, not competitive.'*

		‘Personal interest in my research.’ *‘Showing interest in PhD research is essential.’* *’Allowing freedom to chose focus within the study.’*
Role model	*‘Personal example in the attitude to the research and working moral.’*	
Research environment	*‘Provide a competent and supporting scientific environment (people).’*	
Communication and interest		*‘Good interpersonal relationship/communication.’* *‘Be a good listener and try to see through the eye of researcher. Above he or she bring unbreakable trust on the abilities of the students.’* *‘Not providing direction and structure but rather coach me in the right direction. Experienced supervisor being able to see my needs for supervision and letting me learn from my own mistakes.’* *‘I am not sure if it included in the "active involvement" but I feel that it is important, that I feel that my supervisor is interested in my research. Otherwise it could get very lonely, and then it is important to be reassured, that the research matters.’*

As shown above, the additional comments mainly concern communication and motivation.

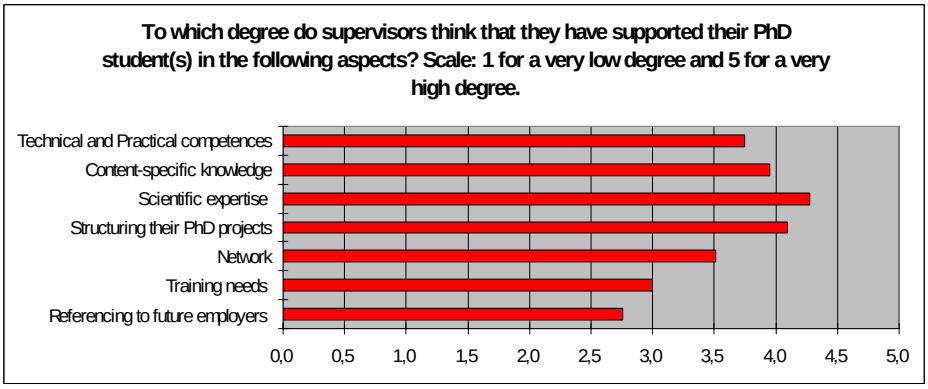

Figure 4.15: To which degree do you think that you have supported your PhD student(s) in the following aspects?

In general, PhD supervisor respondents think that to different degree they provide positive supports to their PhD students in the aspects of:

- scientific expertise,
- structuring their PhD projects,
- content-specific knowledge,
- technical and practical competencies, network.

This result is consistent with the previous results where PhD-students highly appreciate these specific supervisor qualities as shown in figure 4.14.

The support of the supervisors is rated lowest in regards to "referencing to future employers", although, it scores over the middle of the scale. However, it is not the employability or future career aspects that dominate the supervision.

	N	Percentage
Yes	90	84,90%
No	12	11,30%
I don't know	4	3,80%
I alt	106	100,00%

Table 4.7: Do you discuss with your colleagues about the submission criteria for the quality of a PhD thesis?

Table 4.7 presents the answers to the question of whether PhD supervisors discuss the submission criteria for the quality of a PhD thesis with their colleagues. Nearly 85% of the supervisors indicate that they discuss the criteria with colleagues, only one out of ten answers no.

	N	Percentage
Yes, definitely	22	21%
Yes, maybe	41	39%

Probably not	20	19%
No	17	16%
I don't know	5	5%
Total	105	100%

Table4.8: PhD supervisors' willingness of participation in activities for improving PhD supervision

Table 4.8 presents the answers to the question of whether PhD supervisors would like to participate in activities for improving PhD supervision, for example, a 2-day seminar. As can be seen around 60% are positive. However, it is a bit surprising that around one third of the supervisors are not or probably not willing to participate in these activities.

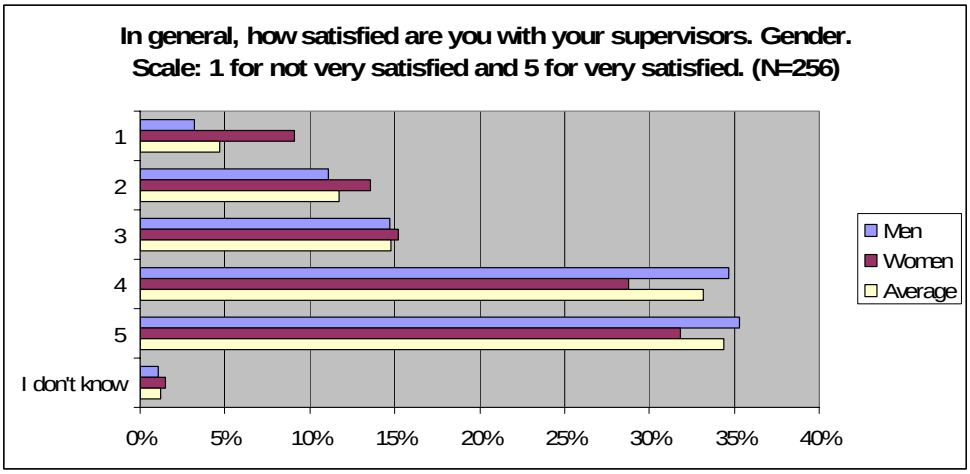

Figure 4.16: Satisfaction with supervisors. Gender

Figure 4.16 illustrates a general satisfaction of PhD students towards their supervisors, as 83% students answered 'almost satisfied', 'satisfied', and 'very satisfied'. But still we have to remember that little less than 20% are partly or not satisfied. Even though the figure indicates a gender perspective there are no significant differences in the level of satisfaction according to gender[9].

This question is also cross checked with why the supervisors were appointed in order to see if the fact that funding holders also are supervisors might create a special tension. This doesn't seem to be the case[10].

4.7 Conflicts in supervision

> *'As a PhD student, I felt powerless. I didn't know that what it should be, how many times and hours I can have a meeting with my supervisors… I*

[9]*The correlation is *not* significant at the 0.05 level.
[10] *The correlation is *not* significant at the 0.05 level.

don't know what will be my rights. And the problem is my supervisors don't think that there is a problem.'
- a PhD student

Although there is a high degree of satisfaction, there are also problems and conflicts.

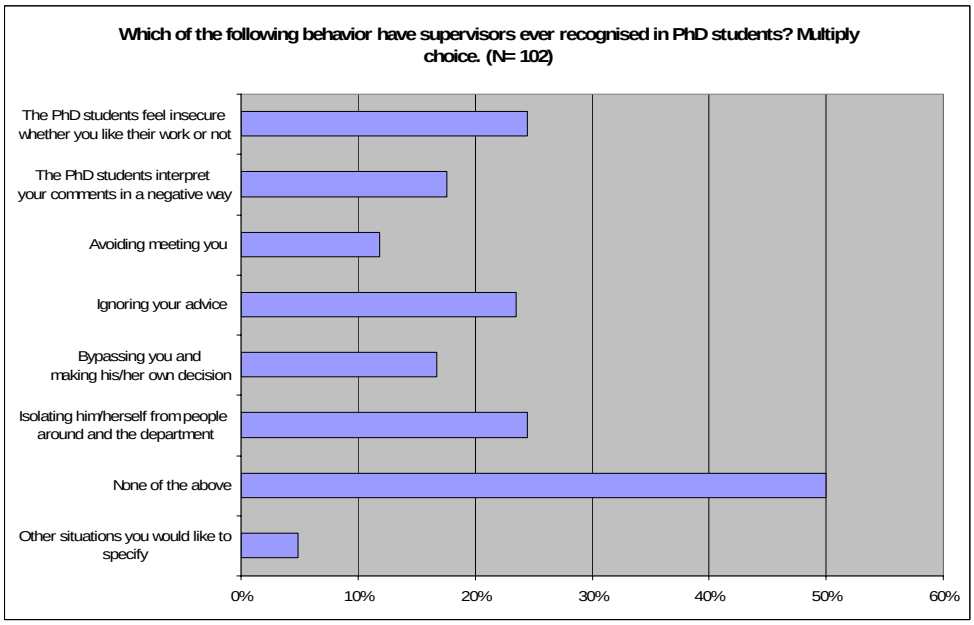

Figure 4.17: Which of the following behaviour have supervisors ever recognized in PhD students? Multiple choice.

The categories in figure 4.17 are set up with inspiration from Rugg and Petre (2004). None of them seem to be very dominant, however, about a quart of the supervisors recognize isolation from department, ignoring of advice and feeling insecure weather the supervisor like their work or not. Some of the supervisors mention in additional comments that one out of ten PhD students behave like this and some say that these behaviours exist for all PhD students, but normally only for short periods of time.

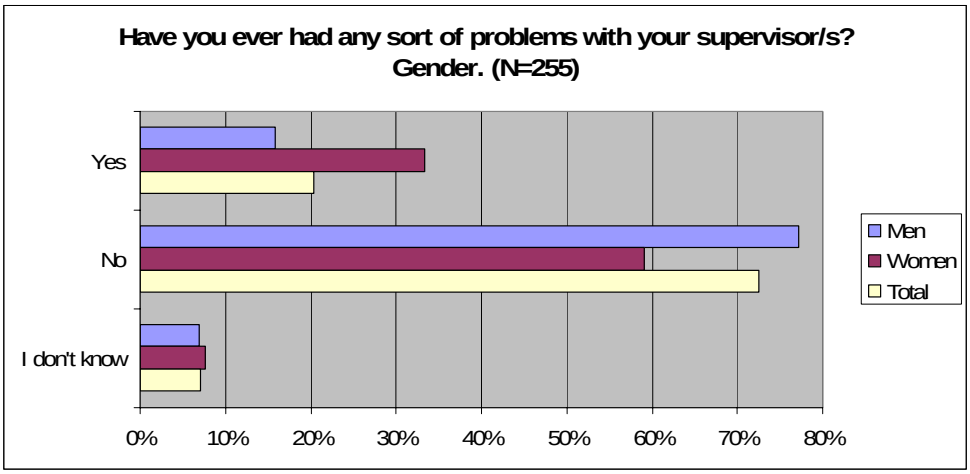

Figure 4.18 Confronting problematic issues. Gender.

Figure 4.18 illustrates that on average 20% of the PhD students have experienced some kind of problems in supervision. On average, more than 70 % of the PhD students answer no. However, the percentage of women answering yes is the double of the percentage of men saying yes[11]. It was expected that the frequency of PhD students answering yes to this question would be much higher. So the level of satisfaction among PhD students is pretty high in general, but still one fifth answers that they have experienced problems with their supervisor.

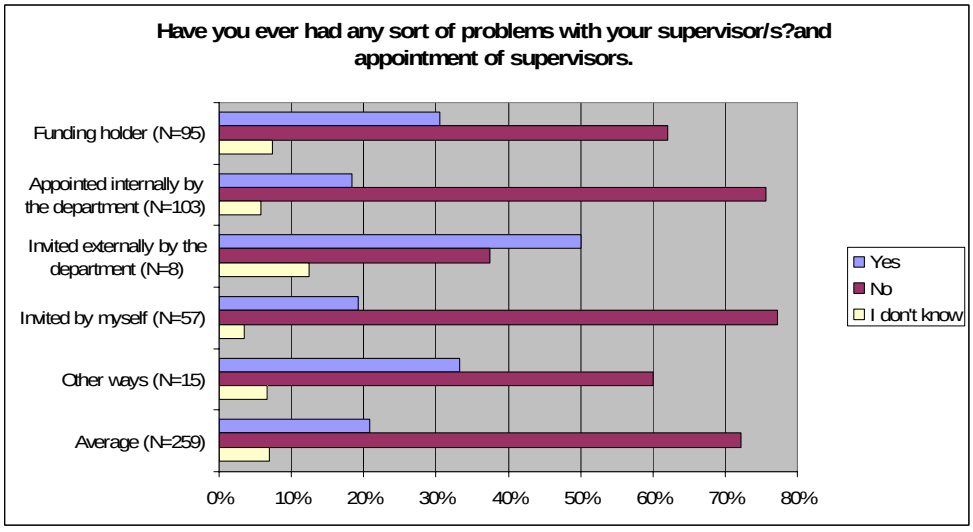

Figure 4.19: Funding holder and problems with supervisor.

One of the hypotheses for this study is that the fact that funding holders often are supervisors might create a more complicated situation for PhD students if they run into problems. Therefore, figure 4.19 illustrates the percentage of funding holders compared to other types of appointment of supervisors and if the PhD students experience to have

[11] *The correlation is significant at the 0.01 level.

problems or not. The two main ways of being appointed is either to be a funding holder or to be appointed internally by the department. Comparing these two factors, it seems that a higher percentage of PhD student with supervisors as funding holders do have problems than compared to students with supervisor appointed internally by the department or invited by the students themselves. Invited externally by department is not interesting because of the low number.

	N	Percentage
No, never	18	17 %
No, not as far as I remember	22	20 %
Yes, once a while	66	61 %
Yes, often	3	3 %
Total	109	101 %

Table 4.9: Have you ever had any sort of problems with your PhD student(s)?

Table 4.9 presents answers to the question of whether PhD supervisors think that they have experienced any sort of problems, and more than half answers once in a while. What is even more surprising is the comparison with the answers from the students where only 20% answers they have had problems with their supervisor. So more supervisors than students seem to experience problems. However, as figure 4.19 indicates, there are still one fifth of the PhD students who experience problems with their supervisor. What kind of problems they meet can be seen in table 4.10.

	N	Percentage
Mismatch in expectations	30	55 %
Lack of positive communication	28	51 %
The PhD student felt lack of support from the supervisor with respect to direction and structure of the PhD project	37	67 %
The PhD student felt lack of support from the supervisor with respect to technical competences and scientific expertise	20	36 %
The PhD student felt lack of access to supervisor's network	11	20 %
The PhD student felt lack of personal support from supervisor	17	31 %
The PhD student felt lack of freedom to use research results	4	7 %
The PhD student felt excess work pressure	11	20 %
The supervisor felt lack of interest and motivation in the PhD student	10	18 %
The supervisor felt lack of efforts made by the PhD student	11	20 %
The supervisor felt lack of quality in the PhD student's work	7	13 %
The supervisor felt lack of progress in the PhD project	12	22 %
Other issues (Please specify)	11	20 %
Total	55	

Table 4.10: What did the problem(s) concern for PhD students? (N=55) Multiple choice.

As can be seen in the table the five most dominant types of problems are:

- Lack of support from the supervisor with respect to direction and structure of the PhD project, 67% .
- Mismatch in expectations, 55%.
- Lack of positive communication, 51%.
- Lack of support from the supervisor with respect to technical competences and scientific expertise, 36%.
- Lack of personal support from supervisor, 31%.

The additional comments to this question document the existence of typical issues as e.g.

Personal communication:

- *'Personal incompatibility. From the professional point of view everything is excellent.'*

Lack of interest

- *' Felt lack of interest in project from supervisor.'*
- *'I felt lack of time for supervision and engagement in the supervision.'*
- *'Lack of information from supervisor.'*

Misuse of PhD students

- *'I worked 6 months on a project for the research centre, but they did not pay the teaching hours as agreed with my supervisor and the centre! First after 9 months of negotiation they finally paid! But during the negotiation the support from my supervisor was very limit :-(.'*
- *'Too much work that did not concern the PhD study.'*

What kind of problems did the PhD supervisors experience?

	N	Percentage
Mismatch in expectations	27	41 %
Lack of positive communication	12	18 %
The PhD student felt lack of support from the supervisor with respect to direction and structure of the PhD project	8	12 %
The PhD student felt lack of support from the supervisor with respect to technical competences and scientific expertise	2	3 %
The PhD student felt lack of access to supervisor's network	0	0 %
The PhD student felt lack of personal support from supervisor	6	9 %
The PhD student felt lack of freedom to use research results as they wish	3	5 %

The PhD student felt excess work pressure	18	27 %
The supervisor felt lack of interest and motivation in the PhD student	17	26 %
The supervisor felt lack of efforts made by the PhD student	27	41 %
The supervisor felt lack of quality in the PhD student's work	23	35 %
The supervisor felt lack of progress in the PhD project	38	57 %
Other issues (Please specify)	8	12 %
Total	66	

Table 4.11: What did the issue(s) concern for PhD supervisors? Multiple choice.

Table 4.11 illustrates answers from 66 PhD supervisors to the multiple choice questions about problems with PhD students..

Four important issues were emphasised by the answers from PhD supervisors. As can be seen in table 4.11, these are:

- Lack of progress in the PhD project, 58%.
- Lack of efforts made by the PhD students, 40%.
- Mismatch in expectations, 40%.
- Lack of quality in the PhD student's work, 35%.
- Excess work pressure, 27%.

Compared to the priorities in PhD student's answers in table 4.10, the supervisors' answers differ very much. The only repetition is mismatch in expectations; otherwise the PhD students focus on support with structuring the project and scientific expertise as well as the communication situation whereas the supervisors focus on the students' abilities and work effort.

Additional comments bring up some new aspects regarding the qualification level and PhD students' lack of interest. But there are also comments about the intercultural communication, gender issues and cooperation with companies.

How was the problems solved?

	N	Percentage
Meeting with the supervisor	20	71 %
Meeting with Head of Doctoral Program	3	11 %
Involvement of the Doctoral School	3	11 %
Other ways	8	29 %
Total	28	

Table 4.12: How was/were the problem(s) solved? (Ph.D. students' answers). Multiple choice.

Table 4.12 shows how the PhD students think the problems were solved. More than 70% indicate that the conflicts were solved during meetings with the supervisor.

	N	Percentage
Meeting with the PhD student	54	83 %
Meeting with Head of Doctoral Program	6	9 %
Meeting with Head of Department	5	8 %
Involvement of the Doctoral School	5	8 %
Other ways	8	12 %
Total	65	

Table 4.13: How was/were the problem(s) solved? (Supervisors' answers). Multiple choice.

Table 4.13 shows how the supervisors experience the means of solutions. Their answers are very much in line with the PhD students' answers.

Normally the solution is to discuss the problems with the supervisor. But in 20% of the cases, the Doctoral School or the head of department have been involved. This involvement is common practice when PhD students want to shift to another supervisor. In the additional comments there are other proposed solutions, for example. to involve a trusted colleague. However, there are several supervisor's how answers that the PhD student have dropped out – and that solved the problem.

It takes time to solve such kind of problems – there will be a long period just for acknowledging the problem. In the questionnaire for PhD students, the question of 'how long does it take to solve the problems' was asked. Half of the PhD students do not believe that the problems were solved at all. There are grounds of concerns and a solution to this problem could be to establish a study consultancy so there would be an official place for PhD students to go to.

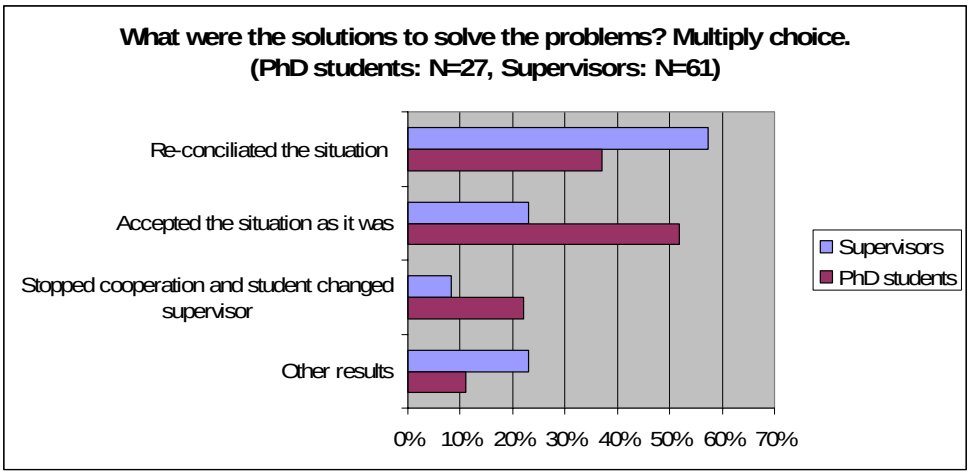

Figure 4.20: Kinds of solutions. Multiple choice.

Figure 4.20 presents possible outcomes of the conflict between students and supervisors based on a multiple-choice question found in both questionnaires. There is quite a difference in PhD student's answers and PhD supervisor's answers. Several PhD

supervisors indicate other solutions to the conflict and out of the 23 responses half of the responses were that the PhD student stopped.

As one of the last questions in the questionnaire for PhD students, a question was put forward: 'Imagine yourself at the point where you chose to do the PhD in the light of the experience you have today, would you choose to do the PhD again?' shows the responses to this question.

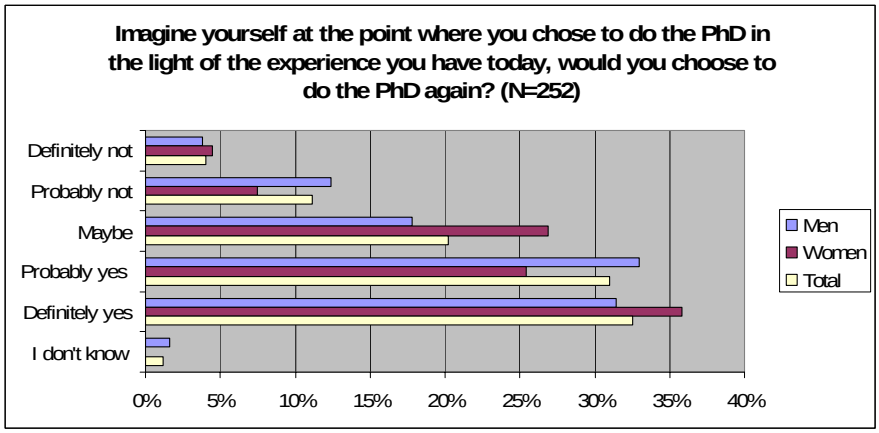

Figure 4.21 Would PhD students do the study again. Gender.

Among the 252 respondents to this question, more than 60% would consider to choose a PhD study again. However, more than 30% are doubtful. There are no significant differences between men and women in this regard, even though women at first glance seem to be more doubtful than men[12].

4.8 Summary and conclusion

The study shows that one third of the supervisors are appointed because they are funding holders. Furthermore, two third of the PhD students are unaware of the possibilities to choose their own supervisors and more than half of the supervisors do not know of this or thus do not it is not possibly for PhD students to choose their own supervisor. Consequently, there seems to be some uncertainties concerning this matter and the rules for assigning supervisors should be made clearer.

During the past six years, the Doctoral School has recommended to appoint more than one supervisor. This study shows that this is not the case – a bit more than half of the PhD students have two or more PhD supervisors.

About two thirds of the PhD students have regular meetings on a monthly basis, but still one third of the PhD students have fewer meetings than that. That might not be a problem although it is worrying to see that nearly 20% of the PhD students indicate that meetings take place every 6 month or less frequent. One quarter of the PhD students also indicate that the frequency of meetings is too low.

[12]* The correlation is *not* significant at the 0.05 level.

The type of response that PhD students think they receive is in accordance with the supervisors' opinion. It primarily regards academic issues. However, supervisors think they give much more response to personal issues than the PhD students experience to get. Giving response to personal issues is in accordance with the literature within this area stating that discussing personal issues is an important function of the supervision process.

There is also accordance between supervisors' and PhD students' view on the actual tasks in the supervision process, and reviewing thesis drafts, publishing, and research planning are pointed out as the most dominant tasks.

PhD students are especially motivated by the objective of the projects, by publications and by sharing experiences. Supervisors nearly have the same ranking of issues. So, also in this case there is accordance between PhD students and supervisors. A gender perspective also exists as women receive motivation from participating in PhD courses. In general, many of PhD students also get motivation from their supervisors.
When asking for the overall level of motivation one quarter of the students place themselves at the average point of the scale and one firth at the low or very low end of the scale. So, this leaves many students in a situation where more motivation is needed.

Production of publications and new knowledge are the two main expectations by supervisors to the PhD students, followed by a personal development process and finishing the study on time. Supervisors think that these expectations to a high degree match the PhD students' expectations.

Supervisors feel a much higher degree of responsibility towards helping the PhD students finish their study than towards giving advice on future career choices. In general the career aspect is not dominant at all in supervisors practice, although employability has become part of the PhD studies as not all candidates can remain employed in academia after finishing their study and have to find career options in industry. A surprisingly high percentage of PhD students are in their considerations on future careers oriented towards both academia and industry.

The students also obtain other kinds of help from their supervisors. In general a little less than half of the students answer that they receive help with their involvement in teaching and course development as well as the PhD supervisor provides references. Furthermore, the planning of future employment is also part of the supervisors' help. However, one fifth of the students do not experience this kind of help, so the question is, whether future employment strategies, as well as support with teaching tasks, should be a central activity at the university.

Overall, the PhD students seem to agree with the supervisors about the quality of supervision. However, the PhD students judge the supervision practice at a lower score compared to the ideal functions. Still, there are also differences as supervisors rate the supervision process to be of a higher quality than the students. This is especially true for

the topics: “providing direction to the PhD research” and “active involvement in the PhD project”.

Scientific expertise and technical and practical competences are the aspects where students and supervisors have the highest level of agreement regarding quality.

To the question about actual cooperation with supervisors it seems that whether PhD students have one or more than one supervisor the areas of cooperation in general are the same. Publishing, research planning and reviewing the thesis drafts have the highest score. The supervisors rank the same three cooperation areas. Writing articles together with supervisors seems to be dominant for nearly all PhD students.

But if we look at the qualities PhD students think their supervisors have, the general score of the answer is just a little more than average on the scale for the quality factor: ‘Providing help and guidance in PhD training’. For the factors: ‘Providing personal support’, ‘direction to the PhD structure’ and ‘active involvement in the PhD project’ the rating is less than 3.5. So these factors could be the ones where the supervisors develop a strategy for improvement because it is the same factors PhD students point out as qualities they expect from a good supervisor.

In general, PhD students are quite satisfied with their supervisor and many of the respondents have no problems. But one fifth of the students had experienced problems and the female students have a higher score for this question – nearly one third of the women have experienced problems. At the same time it seems that more PhD students with supervisor as funding holder have problems compared to students where the supervisor have been appointed in other ways.

The interesting issue is that more than half of the supervisors answer that they have experienced problems once a while.

The problems, seen from the students’ point of view, are lack of support with respect to technical competence and scientific expertise, mismatch in expectations, and lack of positive communication.

The problems, seen from the supervisors’ point of view, are lack of progress in the PhD project, lack of efforts made by the PhD students and mismatch in expectations. So, an important common point is mismatch of expectations where both parties have experienced problems. Being clear about expectations might solve other problems as well. Lack of support with respect to technical competence and scientific expertise and lack of positive communication are aspects for improvement as well as progress in the PhD project and lack of effort calls for solutions.

If the students have experienced problems these were to a high degree solved during meetings with their supervisor. But this study also shows that solving problems can take time and unfortunately some problems were not solved. In times of troubles there is also

a tendency towards PhD students accepting the situation or changing supervisor, whereas some indicate that the PhD students have stopped.
In general, we can conclude for this chapter on supervision that:

- There is a very international environment for PhD students and especially foreign student need to have a better introduction to the Danish systems.
- The general picture is that PhD students and supervisors share opinions on the functions and tasks in supervision.
- There is a high degree of satisfaction with the supervision among PhD students, still one fifth of the PhD students have experienced some kind of problems
- Supervisors have to be more aware of the motivation factors and orientation towards future career options.
- PhD students with problems might need somebody outside department to help developing problem solving strategies.

5. Work conditions

> *'There is a word of workaholic, that is for me, I am working most of the time, no social life, but it is ok since I enjoy what I am working on. I spend the days on teaching, and spare time and holidays on my PhD. I take my work as hobby'.*
> *– a female PhD student*

At The Faculty of Engineering, Science and Medicine, Aalborg University, PhD students have the obligation of doing both a PhD study and work for the institution for a total of 840 hours[13] during their three-year-long employment contract. The work can consist of research communication, research or teaching, and in practice it is common that students chose teaching tasks to fulfil this work obligation. The PhD study includes carrying out the PhD research project (as the result of which a thesis is expected to be carried out) and attending PhD courses to obtain 30 ECTS credits (which also are equivalent of 840 work hours). These requirements bring about various challenges for the life situation of PhD students. Work load and how to arrange the different tasks based on time limitation are often-heard topics as hard and time-consuming activities for PhD students. Therefore, during the preparation of the survey, plenty of concern was put on the issues of work load and time arrangement of PhD students.

5.1 Workload

We often hear complains concerning the work load – too much pressure and high expectations from PhD supervisors, too many teaching tasks, etc. Especially the Aarhus investigation show very high amount of working hours per week, where 66% of the PhD students indicated that they worked more than 45 hours per week. 33% of the supervisors indicate that they expect their PhD students to work more than 45 hours per week (Ph.d.-vejledning ved Det Naturvidenskabelige Fakultet, 2005).

The results from this study show a quite different picture. Maybe the very stressed PhD students did not have energy to answer the questionnaire, maybe the PhD students methods for calculating hours have not been precise enough. However, the results based on these questions show that the time pressure is not enormous, the amount of teaching tasks seems to be acceptable for most of the PhD students, but it also leave concerns and some unanswered questions.

In the questionnaire there were questions for PhD students and one question was asked for PhD supervisors concerning working hours for a PhD study. Both questions and results are illustrated in the following.

[13] Information see website http://adm.aau.dk/fak-tekn/phd/finans.htm

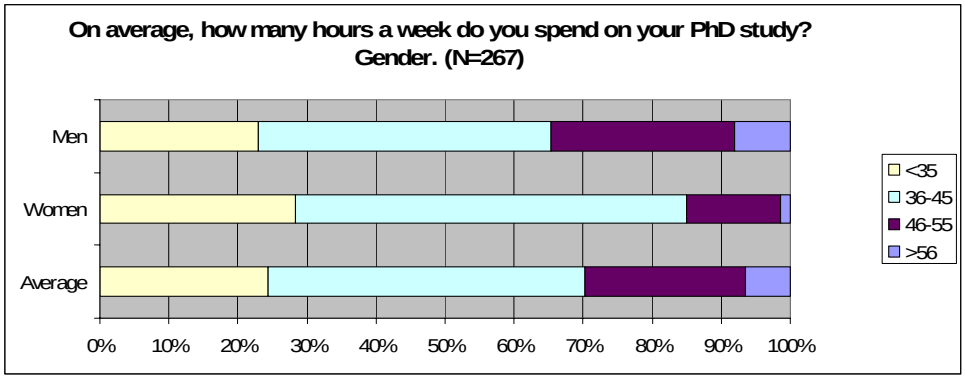

Figure 5.1: Work hours per week. Gender

Figure 5.1 shows the average numbers of work hour per week combined with gender. The normal expectation is that women work more, however according to the results in this study; women work less at an average scale[14]. Maybe women are more honest when answering the questionnaire – or more structured at work as this result has to be seen together with the result on the family situation in figure 3.2, which shows that especially female Phd Students have a spouse and/or children.

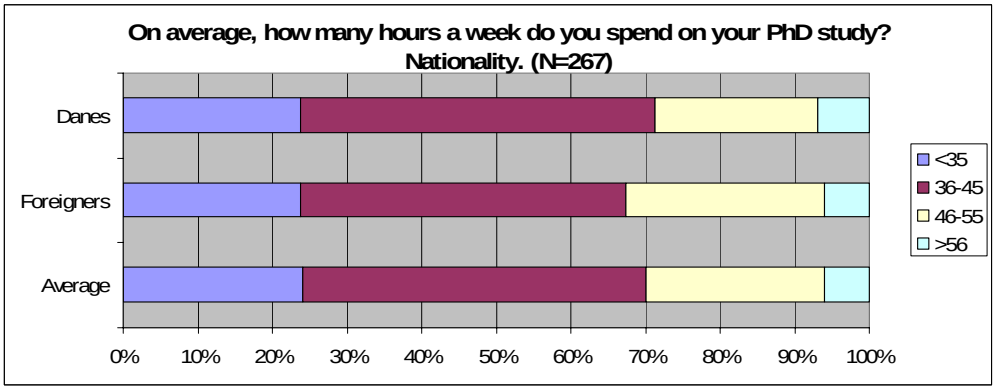

Figure 5.2: Work hours per week. Nationality.

Figure 5.2 shows the international dimension of work hours. It is a common perception that foreign PhD students work more than Danish PhD students. The relation between working hours and nationality is, however, not statistically significant[15]. So also in this case, our study is dispelling out notions of reality.

[14] *The correlation is significant at the 0.05 level.
[15] *The correlation is *not* significant at the 0.05 level.

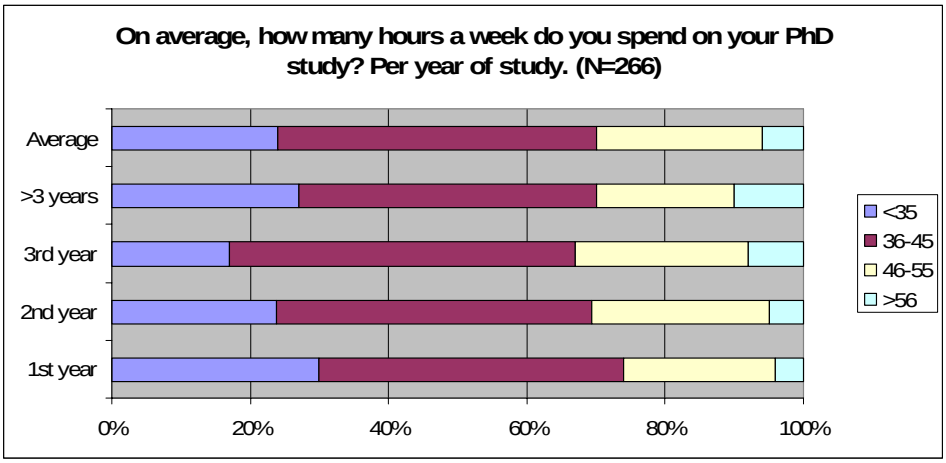

Figure 5.3: Work hours per week. Year of study.

Furthermore we have analysed if PhD students in their 4th and 5th year do not use as much time at their PhD study as PhD students in the first three years, because they have to find other ways of funding the study, as to get a teaching position for a while. Figure 5.3 shows that this is not the case and we do not have to correct our data concerning that factor[16].

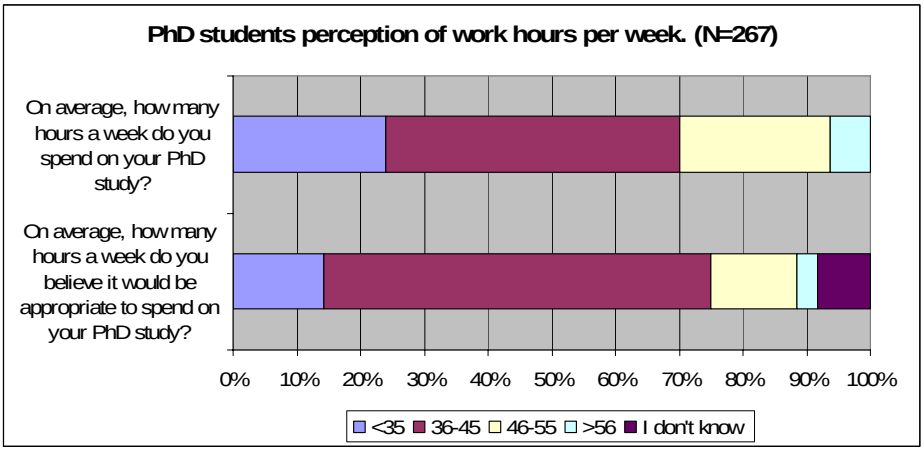

Figure 5.4: Comparison of actual use and appropriate use of hours per week.

Figure 5.4 compare results from 2 questions on average work hours a week: how many hours PhD students spend and how many hours PhD students think it is appropriate to spend.

Workload is pretty complicated to measure. Even if this study cannot document that there is an increased workload during the study, time pressure will always vary. There will always be periods where the amount of working hours will be enormous and periods where there might not be such a pressure even if this study shows that there is no real difference during the entire study. Answering on an average level might include some

[16] *The correlation is *not* significant at the 0.05 level.

uncertainties. Furthermore, in this case there is the uncertainty that the respondents had to answer for both number of hours used on the PhD study and on teaching obligations. This might have caused some confusion and the results should be interpreted with this in mind.

Looking at the results, it seems to be a "normal" academic workload with one fifth answering less than 35 hours, nearly half of the respondents using 36-45 hours and a bit less than one third using more than 46 hours per week. That 20% of the students answers less than 35 hours comes as a surprise. Compared to what PhD students think is appropriate, more respondents find it appropriate to use 36-45 hours per week.

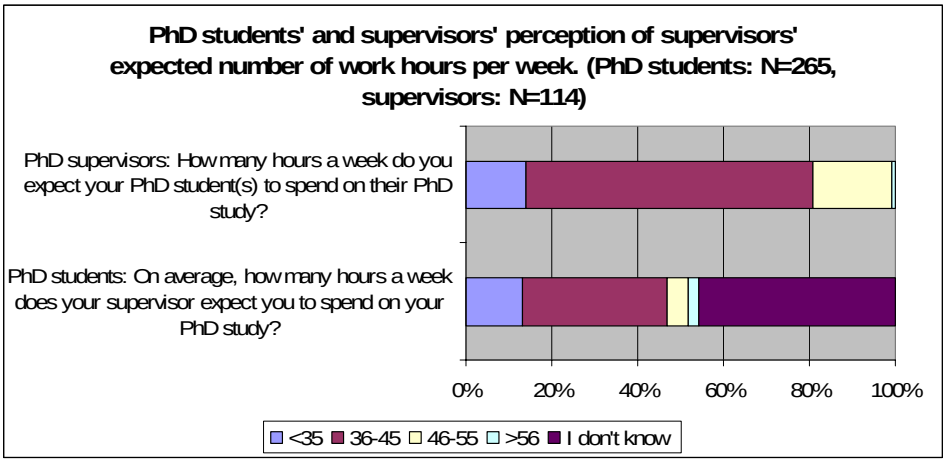

Figure 5.5: Comparison of supervisors' expectations and PhD students' presumptions of supervisors' expectations.

Figure 5.5 shows the expectations of the supervisors. There is a comparison of the question to the PhD students: how many hours they believe their supervisors expect them to spend with the question to the supervisors: how many hours a week they expect PhD students to spend?. Reason for this question is that PhD students sometimes think that their supervisors expect much more than they actually do, which may cause stress.

However, it does not seem that the PhD students in general feel a pressure from their supervisors. 10% of the students experience that their supervisors expect them to work more than 45 hours per week. Maybe the most interesting answer is that almost half of the respondents answer that they don't know how many hours their supervisor expects them to work. This result indicates that a large number of PhD students have no knowledge about the specific expectations of their supervisor.

The supervisors' answers to how many hours they expect their PhD students to work per week are in general higher than the PhD students own expectations[17]. More than 60% of the supervisors expect the students to work 36 to 45 hours per week.

[17] *The correlation is significant at the 0.05 level

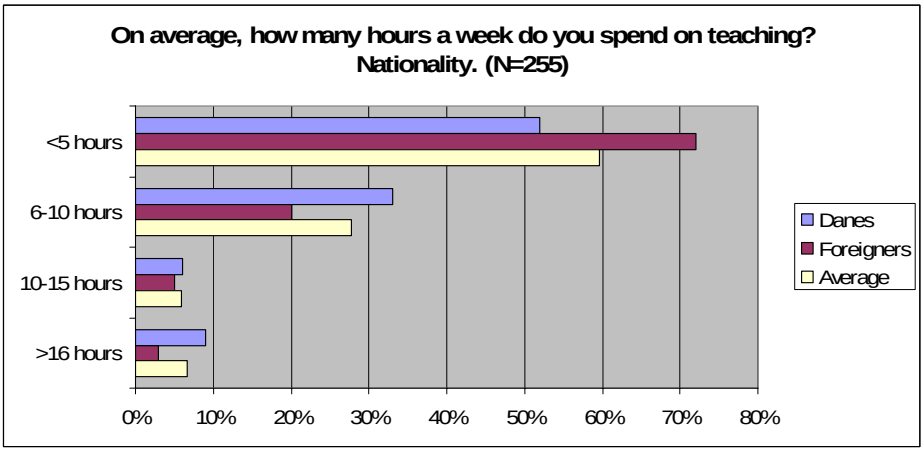

Figure 5.6: Teaching hours for PhD students. Nationality.

In the questionnaire for PhD students, there was a question about working hours spend on teaching, which can be seen in figure 5.6. On average, 60% answered less than 5 hours per week, 28% answered 6-10 hours per week, 13% answered more than 13 hours per week. What is quite surprising here is that foreign PhD students seem to have less teaching hours per week compared to Danish PhD students[18]. Maybe the cause for this is that not all foreign PhD students have a contract for teaching.

An immediate interpretation could be that this does not look alerting; however, still 40% of the respondents use at least a day or more per week on teaching and this has to be added to the average level of workload for the PhD study.

	N	%
Too much teaching so that I don't have enough time for my PhD study	48	19%
A fair balance between teaching and doing my PhD project	129	50%
Not enough teaching	21	8%
I don't know	62	24%
Total	260	100%

Table 5.1: How do you feel about your teaching tasks?

Table 5.1 illustrates how PhD students experience their teaching tasks. Among the 260 respondents to this question, half of the students answer that they manage a fair balance between teaching tasks and doing their PhD project. But almost one fifth of the respondents feel that there are too much teaching so that they don't have enough time for the PhD study. This is not surprising, because this is normally what the PhD students say.

[18] The correlation is significant at the 0.05 level.

	PhD students (N=267)	PhD supervisors (N=117)
Always	4%	17%
Mostly	18%	40%
Half of the time	34%	23%
Once a while	41%	20%
Never	3%	0%

Table 5.2: How often are you working during weekends/or holidays?

Table 5.2 presents an overview picture of working during weekends and holidays (public holidays) for both PhD students and PhD supervisors based on the two questionnaires. Table 5.2 shows that almost a quarter of the students find that they are working always or most of the time meaning also weekends and holidays. About a third states that they work half of their weekends and holidays. Supervisors are working much more often during weekends and holidays compared to PhD students[19].

Reasons for the majority of PhD students to work during weekend and holidays have been investigated.

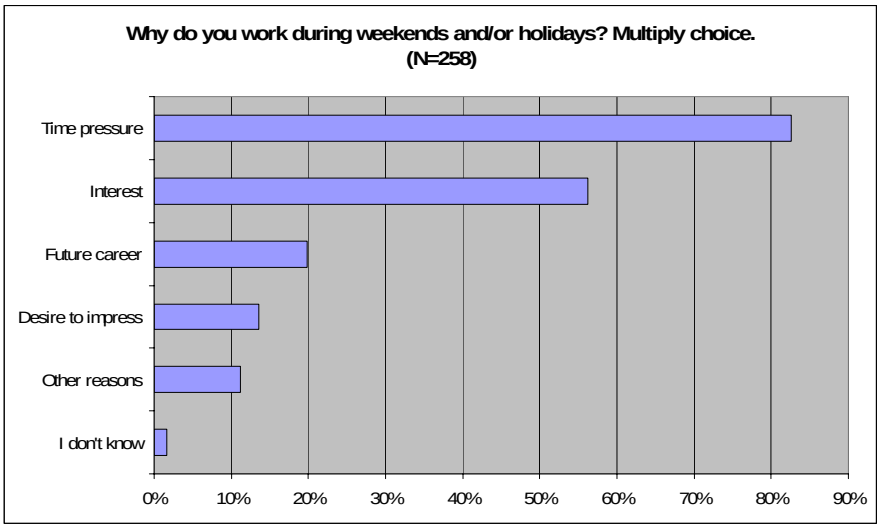

Figure 5.7 Reasons for working during weekend and holidays. Multiple choices.

Figure 5.7 illustrates the main reasons based on the results from the survey. More than 80% of the respondents work during weekend and holidays due to time pressure, more than half due to interest. This indicates some of the reasons for a high average of working hours per week, but the fact that interest plays an important role indicates that work becomes an activity for spare time and might also explain why so many students

[19] *The correlation is significant at the 0.001 level

answered the question about workload with a don't know answer; research is an intervened combination of work and interests .

Though it is interesting to combine the answer where more than 80% of the students answer they feel a time pressure with the answers about average work hour a week where about half of the respondents answered they worked more than 41 hours a week.

32 respondents elaborated on the reasons for working during weekends and holidays. These comments can be generally characterized as following with examples of quotations:

	Quotation
Stress and workload	'When you have certain deadlines e.g. submission for conferences'
	'Too much workload. To spread my weekly hours - I rarely work more than 11 per day. Closer to 9 hours on normal weekdays.'
Nature of the work	'Long experiments which is difficult to finish in 5 days'
	'…mostly because it is necessary for my laboratory work'
	'…mostly because it is necessary for my laboratory work'
	'during week days I am often involved in activities for industrial partners or for WING group, doesn't leave enough time'
	'The cells don't care if it is weekend or holiday'
Plan and ambition	'Desire to do things properly'
	'If I haven't reached my goals though the week'
	' To learn more and more'
Life arrangement	'Sometimes this is appropriate for the family'
	'Constant time periods are needed when you have a busy daily life with children'
	'No social life'

5.2 Work environment

> *'As PhD students we are responsible for learning and social activities. It is very important to be active and to initiate things by ourselves.'*
> *– a PhD student*

This section focuses on how PhD students and supervisors perceive the importance of work environment, social environment in relation to the progress of PhD project. The answers in this chapter are based on more traditional questions about working environment such as facilities, support from supervisors, stress, social environment and integration in the social environment. But also questions from the previous chapters about motivation, workload, communication and satisfaction, problems with the study and loneliness are important factors when assessing work environment. Those factors will be used in the final summary of this chapter.

Some of the previous problems are interconnected with the working environment and integration in the research environment.

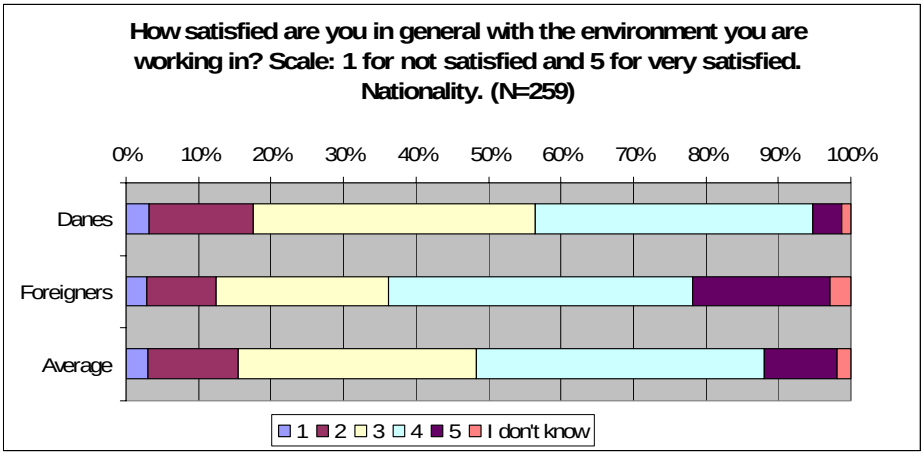

Figure 5.8: Satisfaction of work environment .Nationality.

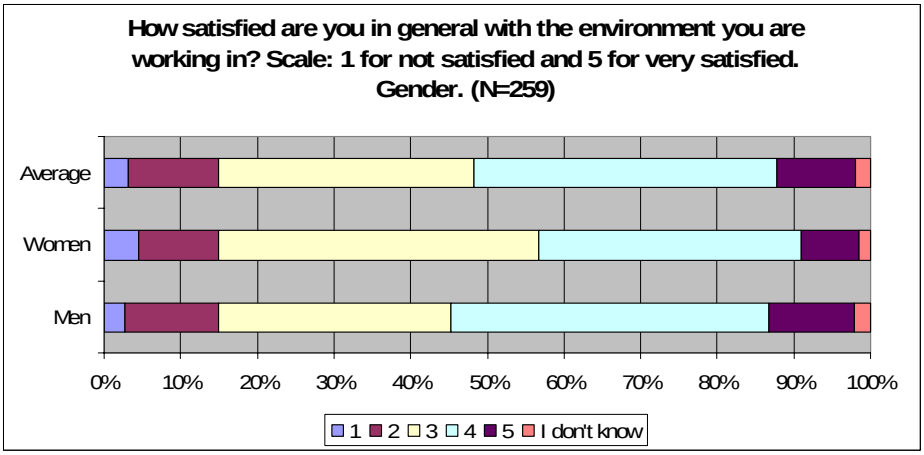

Figure 5.9 Satisfaction of work environment. Gender

Figure 5.8 and 5.9 illustrate how satisfied PhD students are with the environment. On average, half of the respondents chose scale 4 and 5 and one third chooses middle value. However, foreign PhD students are more satisfied than Danish students whereas differences according to gender do not exist[20].

[20] *The correlation between satisfaction and nationality is significant at the 0.001 level whereas the correlation between satisfaction and gender is *not* significant at the 0.05 level

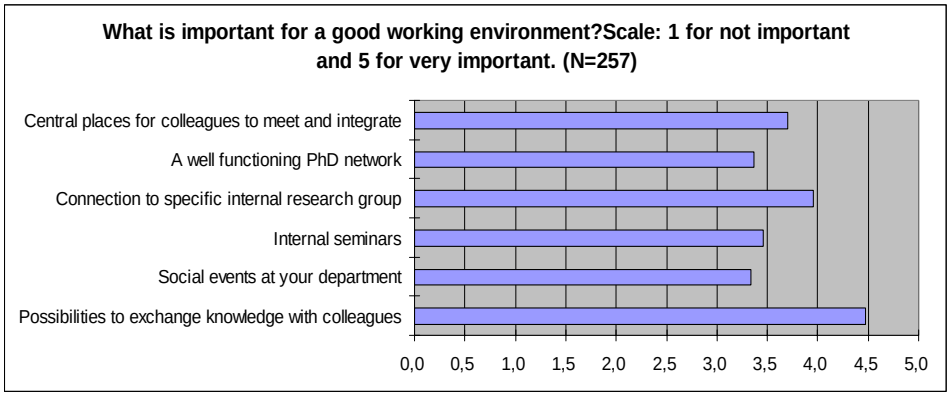

Figure 5.10: Important factors for a good working environment. Average.

Figure 5.10 illustrates PhD students' opinions on important factors for a good working environment. The top priorities for this multiple choice question for PhD students in this study are:

- possibilities to exchange knowledge with colleagues,
- connection to specific internal research group,
- central places for colleagues to meet and integrate.

Although these three factors are regarded as the most important factors for a good working environment, all topics listed above are of great significance as they score more than 3,0 points on a average. All the categories in this question concern communication with colleagues in one way or another. What is characteristic for the priorities are that the PhD students prefer possibilities to exchange knowledge with colleagues and professional internal interaction with colleagues.

Additional comments to this question reveal that especially positive communication and a feeling of being a participant in a research community are important.

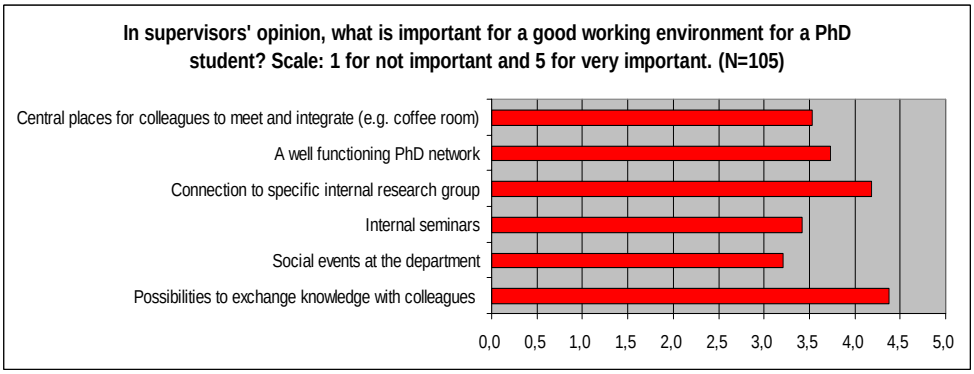

Figure 5.11 PhD supervisors' opinions on a good working environment for PhD students. Average.

Figure 5.11 illustrates PhD supervisors' opinions on important factors for a good working environment for a PhD study. The supervisors give priority to more or less the same

categories as PhD students do. The only difference being that supervisors make a well functioning PhD network a higher priority than the PhD student. Though supervisors also see interaction with colleagues at their department as an important aspect for a good working environment for the PhD students.

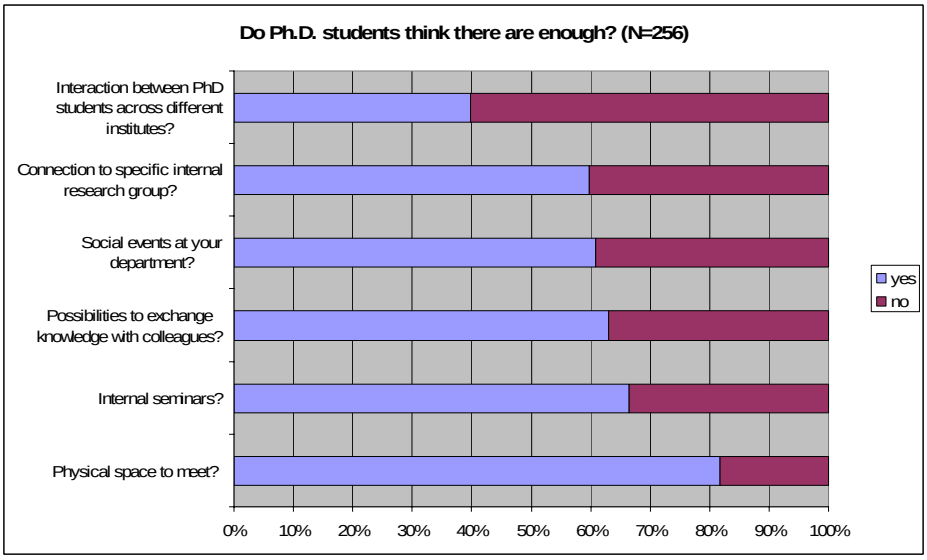

Figure 5.12 PhD students' opinions on their current work environment

Figure 5.12 illustrates whether PhD students think that there are enough facilities in relation to the different factors for a good work environment. In general, more than half of the PhD students gave positive comments to most of the above listed factors concerning their current work environment. The one exception is the factor of 'interaction between PhD students across different institutes' to which more than half of respondents gave a negative answer.

Regarding the factor of 'Possibilities to exchange knowledge with colleagues', which is rated as the most important feature for a good working environment by most PhD students, 35% of the respondents don't find it sufficient. This does not show a very satisfactory picture. This also applies for the factor: connection to specific internal research group where 40% of the students find this is not enough.

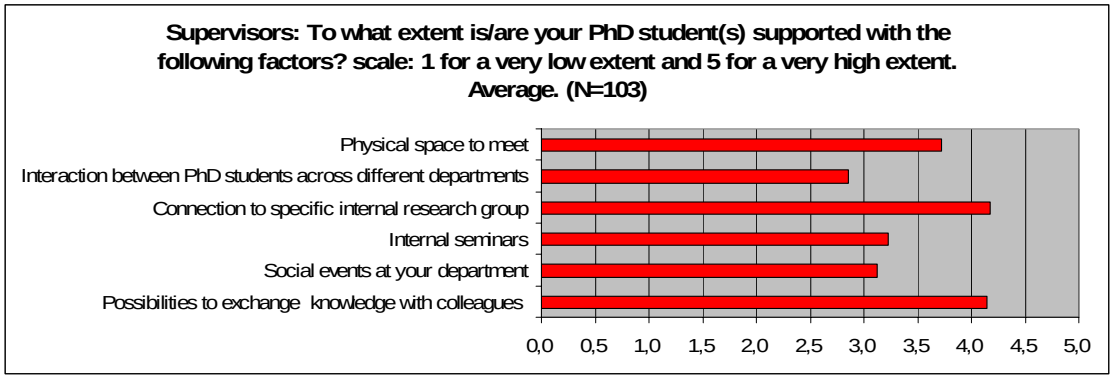

Figure 5.13: PhD supervisors' opinions on the current work environment of PhD students.

Figure 5.13 shows that on average, the 103 supervisors rate the different factors higher than 3, which means that in general, these PhD supervisors think that their PhD students to a great extend are supported with the listed factors connected to qualify the working environment. Especially, the two aspects which are regarded as the most important factors, that is, 'Possibilities to exchange knowledge with colleagues' and 'Connection to specific internal research group' are provided to PhD students seen from the supervisors' point of view. This is also true for many students, but still over one third find it insufficient.

	N	**%**
1	0	0 %
2	4	4 %
3	14	13 %
4	58	53 %
5	32	29 %
I don't know	1	1 %
I alt	109	100 %

Table 5.3: To which degree do supervisors think the working environment matters for the progress of the PhD project? Scale: 1 for very low degree and 5 for a very high degree.

Table 5.3 illustrates to which degree PhD supervisors think that the work environment have an impact on the progress of PhD projects. In general, 85% of the 109 respondents chose 4 and 5 on the scale, which means that nearly all the supervisors regard the work environment as very important for the progress of the PhD study.

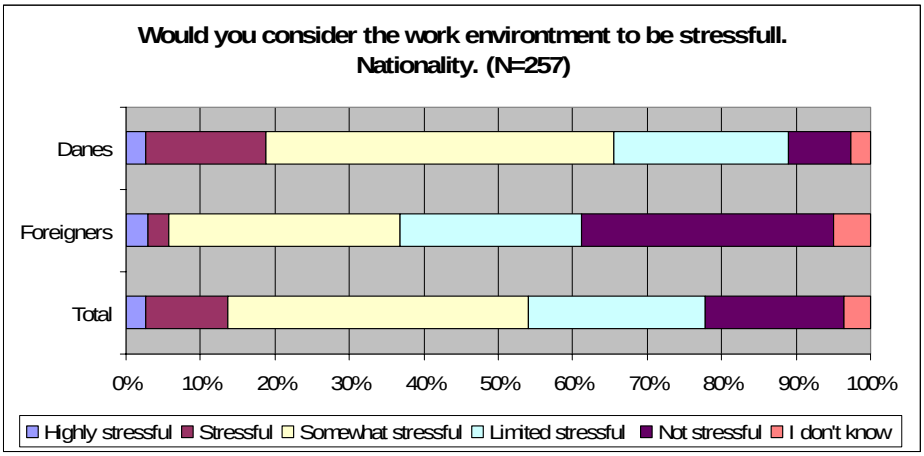

Figure 5.14: Stress level and work environment. Nationality.

Figure 5.14 illustrates whether and to what degree PhD students consider their work environment to be stressful. Interpreting these data raise more questions than answers.
In particular questions concerning the definition of stress: What do we mean when we answer that we find the work environment stressful and what is the individual perception of stress. In this study we take the respondents answer concerning stress as they mark it in the questionnaire. More than half of the respondents experience the work environment to be somewhat stressful, stressful or highly stressful. No matter how the students understand the term stress, there is a problem as 80% of the respondents feel a time pressure and half of the students spend more than 41 hours a week on their work. (See figure 5.1 and 5.2).

Furthermore almost a quarter of the students answers that they are working always or mostly during weekends and holidays, and one third answer that they work half of the weekends and holidays. So there are grounds for concern regarding the stress- and stress related symptoms among PhD students.

It is interesting that foreigners consider the working environment less stressful compared to Danes[21]. Again compared to previous data, foreign PhD students do teach less than Danes.

[21] The correlation is significant at the 0.001 level.

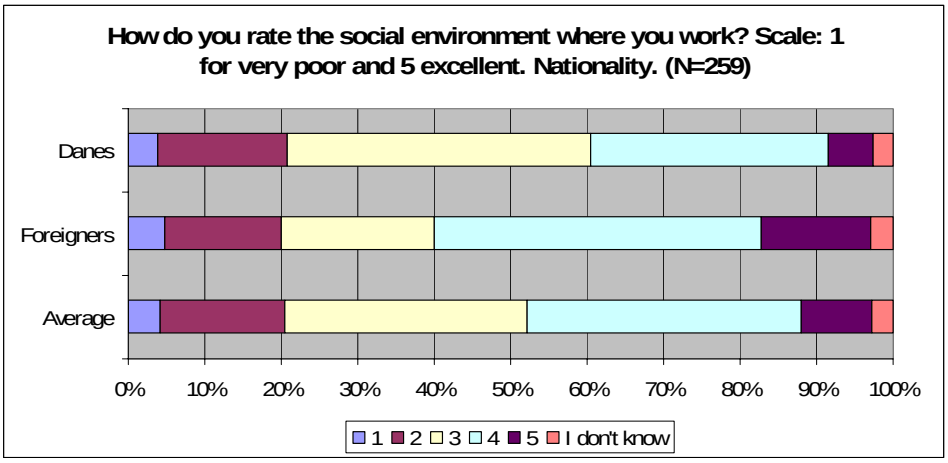

Figure 5.15: Social environment at work. Nationality.

Figure 5.15 illustrates how PhD students rate the social environment at work. In general, 77% of the 259 respondents answer 3 or higher on the scale, which means that the majority of the PhD students are positive to different degrees in their assessments of the social environment at work. Still around 20% of all the respondents are dissatisfied. However, looking at the categories 4 and 5 together in an international perspective, foreign PhD students are more satisfied compared to Danish PhD students[22].

5.3 Loneliness

Loneliness was one of the issues that the PAU wanted to investigate. It is a complex issue – and especially difficult to investigate this by quantitative methods. Furthermore, it is a question of what the criteria should be for judging a high or low rate of loneliness as this is an integrated part of academic life. To read and write might very often be lonely processes. Of course, there are many ways to minimise the feeling of loneliness for example to join a study group for PhD students, to have a study advisor, to meet with colleagues for lunch etc.

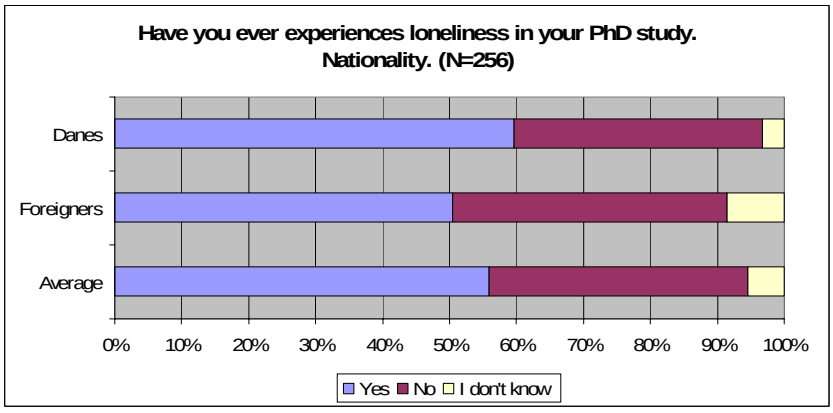

Figure 5.16: PhD students' experience of loneliness. Nationality.

[22] The correlation is significant at the 0.01 level

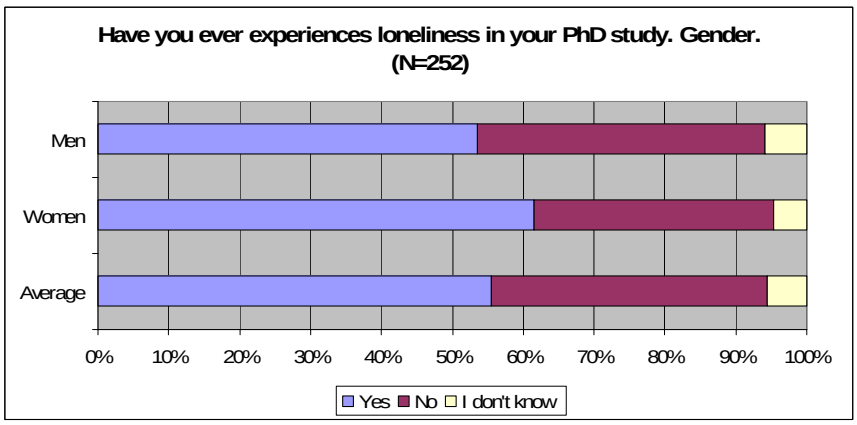

Figure 5.17: PhD students' experience of loneliness. Gender.

As can be seen in figure 5.16 and 5.17 more than half of the PhD students answer that they have experienced loneliness in their study. It was expected that the frequency of foreign PhD students and women experiencing loneliness would be higher compared to average. However, this is not the case as there are no significant differences according to either gender or nationality[23].

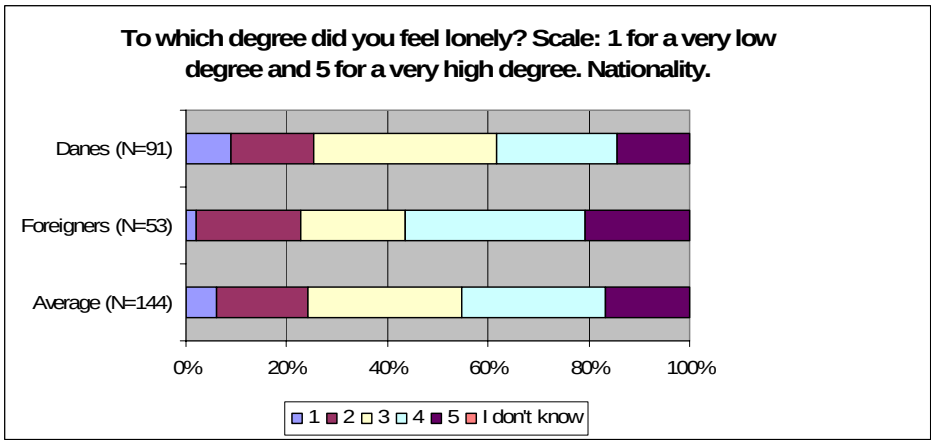

Figure 5.18: Scale of feeling of lonely. Nationality.

In general the degree of feeling lonely is quite high which can be seen in figure 5.16. On average, nearly half of the respondents (65 students) have felt lonely at a high or very high degree whereas one third rate the degree of loneliness to be in the middle category. So loneliness does not only exist, PhD students also experience this as something serious. Concerning the international perspective there are no significant differences between foreign PhD students and Danish students[24].

[23] *The correlation between loneliness and gender/nationality is *not* significant at the 0.05 level.
[24] *The correlation between loneliness and nationality is *not* significant at the 0.05 level

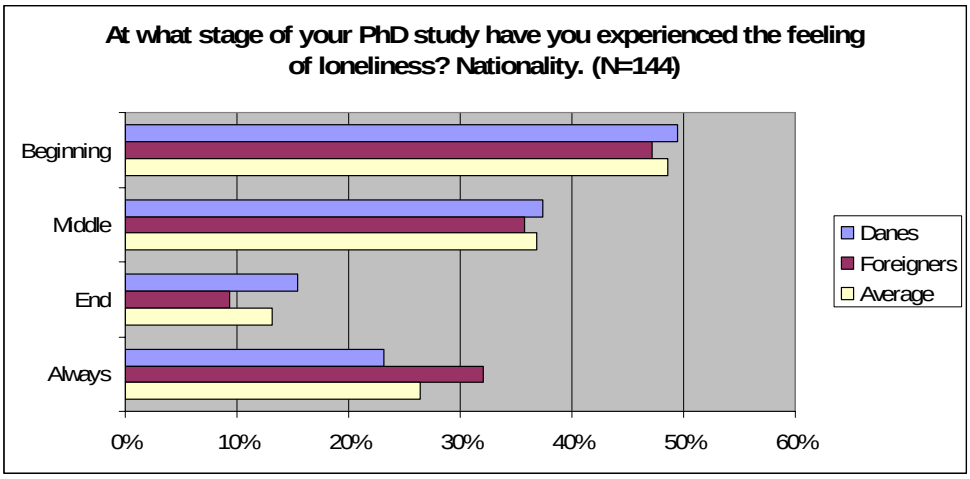

Figure 5.19: Stage of PhD study with the feeling of loneliness. Multiple choices.

It is especially in the beginning and middle of the PhD study that the PhD students experience loneliness, but more than a quarter of the students feels lonely all the time, which can be seen in figure 5.19.

	N	**%**
Yes	69	48 %
No	61	42 %
I don't know	14	10 %
I alt	144	100 %

Table 5.4 Have the feeling of loneliness or work pressure caused difficulty for PhD students in the past?

The feeling of loneliness caused difficulties for PhD students. The results can be seen in table 5.4, where half of the respondents answer that loneliness or work pressure has caused problems.

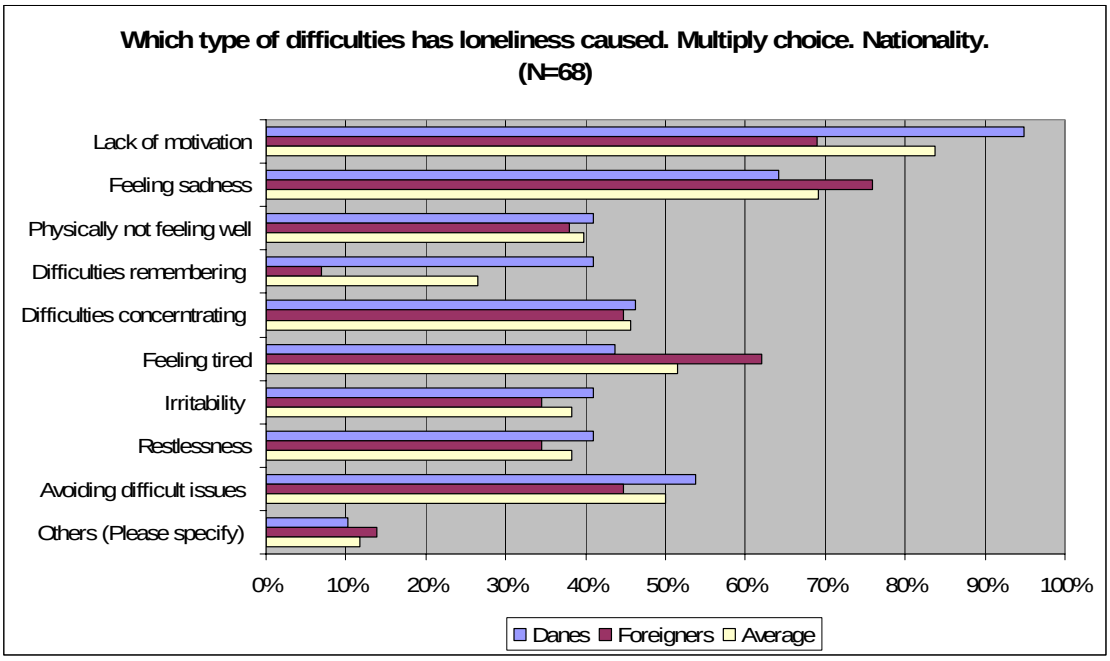

Figure 5.20: Difficulties caused by feelings of loneliness. Nationality. Multiple choices.

Figure 5.20 illustrates that the lack of motivation is the most dominant consequence of loneliness together with the feeling of sadness. However, it is interesting to observe the results of this study as lack of motivation is the most important problem to the Danish students, whereas the feeling of sadness is most dominant to foreigners. So there might be a cultural dimension in these issues. There also seems to be a gender dimension.

Half of the respondents also stress problems as feeling tired, avoiding difficult issues and difficulties with concentration.

Some of these consequences are also symptoms of stress, but nevertheless these difficulties do exist whether they are caused by stress or loneliness and strategies for solving these problems ought to be developed at the institutional level.

Additional answers to the question illustrate that we here deal with serious problems:

- *'Difficult to sleep'*
- *'I have sought help with my union as well as a discussing my situation with a psychologist'*
- *'I was very close to quit, because of the problem with the research centre.'*
- *'Depression (2 months off work)'*
- *'Problems with the family. Caused a divorce'*
- *'Feeling inadequate, loosing self confidence and creativity'*

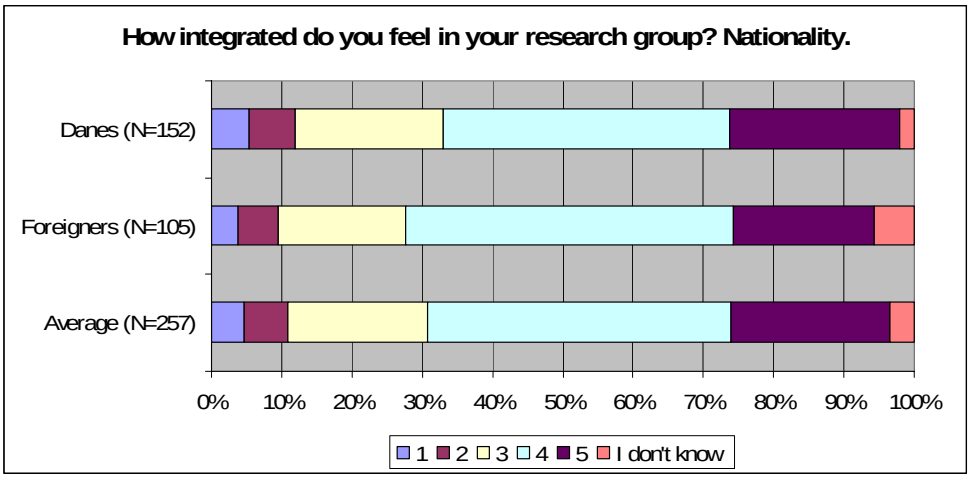

Figure 5.21 PhD students' integration in the research group. Nationality.

Figure 5.21 illustrates how integrated PhD students feel in their research groups.
In previous questions, the PhD students in this study seek more interaction with colleagues. Asking them how integrated they feel in their research group, more than 60 % say they feel integrated at scale 4 or 5. But about one third don't feel really integrated in their research group. There is no significant difference between Danish and International PhD students[25].

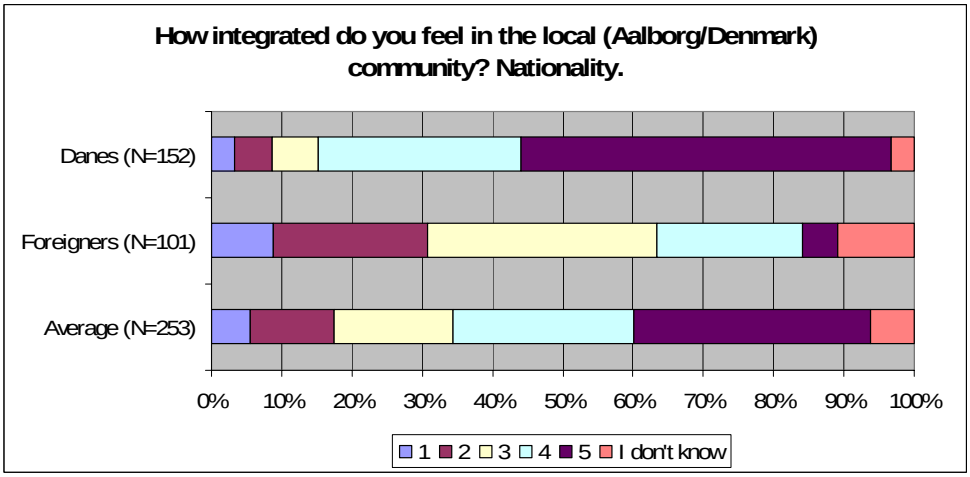

Figure 5.22: Integration in local community. Nationality.

Figure 5.22 illustrates how integrated the PhD students feel in the local community in Aalborg and in Denmark. The background for this question is the high percentage of international PhD students and an expectation that foreign PhD students might not feel the same degree of belonging to the community as the Danes. This is also the case as the

[25] *The correlation between integration and nationality is *not* significant at the 0.05 level

figure shows, and there is a significant association between the felling of integration and nationality[26].

In appendix 3 an elected version of PhD students' general comments are shown. The largest part of these comments concern creations of research communities – PhD students want to be in interaction with their colleagues.

5.4 Summary and conclusions

This chapter on work conditions contains three aspects: workload, work environment and feeling of loneliness. All three aspects are intertwined in the perception of the general working environment.

It is a common preconception that women and foreign PhD students are working more. This study shows that this is not the case. On average PhD students:

- spend approximate 41 hours per week on their PhD study in practice,
- spend further 6 hours on teaching tasks per week, but one fifth answers that they spend too much time on teaching
- half of the students spend many weekends and holidays on their work,

If we calculate the average workload for PhD students, it is close to 46 hours per week, which means that the majority of PhD students work more than what they are employed for (the standard of 37 work hours per week). More than half of PhD students at least work in half of their weekends and holidays – and 80% do it because of time pressure.

Half of the students find there is a fair balance between teaching and PhD work, but 80% also feel a time pressure, and almost one fifth answered that their teaching work is too much. Normally what PhD students say is that teaching obligations are too time-consuming for them and they feel a tremendous time pressure.

The study also shows that on average PhD students think that it is appropriate to spend on approximate 40 hours on the PhD study – so they actually work more than they find appropriate.

In general student expresses a positive attitude towards their current work environment. The supervisors have a clear opinion that the working environment is very important for the progress of the PhD project. International PhD students seem to be more satisfied than Danish students.

On a general level, PhD students are satisfied with a number of specific elements in their current working environment. One of the exceptions for this positive statement is the possibility for exchanging knowledge with colleagues which is regarded very important for a good working environment by most PhD students.

[26] *The correlation is significant at the 0.001 level

Seen from the PhD supervisors' point of view the PhD students are to a great extent supported with all the listed factors connected to qualify a good work environment – so there is a difference in apprehension. PhD students are asking for more exchange of knowledge with colleagues.

Another question asked in connection to work environment concerns stress. More than half of the respondents experience the work environment to be stressful at different levels. No matter how the students understand stress it is a problem that the 80% of the respondents feel a time pressure and half of the students spend more than 41 hours a week on their work. Furthermore, almost a quarter of the students answers that they are work during all or most weekends and holidays, and one third answers that they work half of the weekends and holidays. So there are grounds for concern regarding stress- and stress related symptoms among PhD students. In this connection it is interesting that foreigners consider the working environment to be less stressful compared to Danes.

Motivation is an important part of identifying stress related symptoms. Students get motivated from different aspects. An important role in motivation is played by the supervisor: A quarter of the students indicate that their supervisor doesn't motivate them. The workload is another important part of finding stress related symptoms: A majority of the PhD students work more than they are employed for and half of the students work at least half of the weekends and half of their holidays.

So it is not surprising that more than three quarter feel a time pressure and almost one fifth find that their teaching work is too much.

Feeling lonely is also experienced to cause problems and more than half of the students answer that they have experienced loneliness. It is in the beginning of their study that most of the students feel lonely, but a little more than a quarter feel it all the time, and the loneliness cause difficulties for almost half of the students. Lack of motivation and sadness, feeling tired, avoiding difficult issues and having difficulties with concentration are the most common difficulties connected to loneliness.

Loneliness can also be seen as a problem causing stress. More than half of the students answer they have experienced loneliness. However, loneliness might be part of doing research, but when a little more than a quarter of the students feel loneliness all the time and when the loneliness cause them severe difficulties then there are reasons to be very much aware of the PhD students work environment.

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http://www.ubst.dk/upload/forskeruddannelser/Ministerial%20Order%20on%20the%20PhD.pdf

Appendix 1: General reflections from PhD students

At the end of the questionnaire for PhD students, they are also asked about 'What are the things that have been missing in your PhD study?'. Replies in the text boxes are listed in the following. The answers cover a broad range of topic – more or less everything that is covered in this survey. Far the most comments concern that they miss some kind of a community and supervision. Fewer comments concern content aspect, culture, time and start of the study. These answers underpin that PhD students miss the community aspect and that this has to be strengthen.

Community

- *'more stimulation and collaboration for writing joint articles with other researchers in the field'*
- *'An actual research group for me to be part of, where everybody is working with the same area.'*
- *'Interaction with the industry and social activity.'*
- *'International collaboration and a laboratory exchange: Support from my supervisor to do so. An active research environment with post docs/PhD-student working on related academic problems Carrier guidance A second supervisor'*
- *'We never solved the mismatching ideas of my work. I never felt comfortable with my colleagues. I never found closer colleagues where I felt a common understanding of each other's arguments.'*
- *'External contacts, conference participation, stay abroad,'*
- *'novelty, and cooperation with other students'*
- *'Being in a department with clearly distinct research groups each with a clear definition and direction'*
- *'A well functioning internal research group which could be organized based on a well structured PhD program.'*
- *'More time, team-spirit and the feeling that my work will be useful for someone.'*
- *'Sometimes more seminars at the department would have been nice. The thing is though that it is a balance between a high scientific level from different departments and that is sometimes a bit tricky.'*
- *'Collaboration with other PhD-students around experiments and research topic. More social interaction at the workplace.'*
- *'academic environment (there is no 'real' researchers here), discussions with other researchers, seminars across borders and topics, inspiring courses in my field and in cross field topics,'*
- *'Cooperation with other research groups within the department.'*
- *'- lack of visibility towards final goal of the PhD work - LONELINESS, working in group is SO MUCH more productive and motivating - too much dependency on industrial partners requirements'*
- *'Sports or other entrainment events (except drinking beer in pubs) for all PhD students to integrate with each other as well as with university colleges.'*
- *'contact with other PhD students and sharing my results with them'*
- *'Knowledge exchange and proper discussions at a scientific level on daily level. An open working environment towards interdisciplinary.'*

- *'People with specific knowledge of my topic in the research group. My PhD is sort of isolated technically/scientifically.'*
- *'better integration with current projects at the institute'*
- *'Scientific communication with colleagues, group meetings, sharing ideas, some common scientific work, support from supervisor'*
- *'Exchanging ideas with colleagues. Contributing and being part of the department, having a clear role. Input regarding the teaching and supervision we have to carry out.'*
- *'An internal research group for cooperation in research, a well-planned PhD-project from the beginning, information at beginning of project; "Welcome, you are on your own." My project is co-financed by AAU and industry. To my surprise, it has turned out neither the industrial or my supervisor has had any idea, what I should do in my project.'*
- *'The feeling of belonging to a group of people'*
- *'More socializing with colleagues - more supervision about being a PhD-student, more interaction with fellow PhD students with common scientific interests.'*
- *'someone to discuss my work with'*
- *'A research group that works with a related problem to mine. This context would create a sense of importance around the project and a sense of continuation - that someone is going to use it and take the research further after I finish my PhD.'*
- *'Being part of a research group.'*
- *'External interests and contacts with experts in the field of my PhD studies.'*
- *'Finding the very right people to share particular scientific interests with. Finding my own academic profile.'*
- *'A modern approach to problem solving and knowledge sharing. In industry we advocate for greater knowledge sharing among employees - however we at the university are the worst at practicing it.'*

Supervision

- *'Any form of support from the advisor I've been given. Divisions and endless arguments in department make for an unpleasant work environment'*
- *'good communication strong knowledge in my research topic coming from supervisor'*
- *'motivated supervisor from the beginning research interested colleagues'*
- *'I would never start again in this lab, if I know what I know now. If I was to start again I would make sure that: 1. My supervisor has a good international network that I could also use. 2. Better structuring of my PhD study. Not relying on what my supervisor says and thinks I should do. But be more independent and trust in my own abilities 3. Make sure that my supervisor has experience on the research field, my laboratory switched direction in 2000, and network, co-workers and know-how are starting to appear. 4. Be sure it is an active group with several PhD-students and post docs. Take advantage of PAU arrangements 5. Be more critical of the initial project description. 6. Go for a stay abroad'*
- *'-more scientific interaction with my supervisor. -more social activities'*
- *'I have just started ½-1 year ago. I know my supervisors very well, and I am afraid to "overuse" them. The result is, that I only use them at officially arranged*

meetings - and which we have had 2 so far! I would like to know to which extend I have the right to use my supervisors - there must be some rules???'

- *'Technical guidance and freedom in research.'*
- *'1. A good supervisor. 2. A fair and just supervisor. 3. Good motivation. 4. Availabilities of opportunities.'*
- *'Good supervision, feeling that I am doing something important, that somebody is waiting for the results of the work.'*
- *'Lack of guidance, supervision, project planning and direction'*
- *'Interest from supervisor.'*
- *'Proper and skilful supervision'*
- *'Guidance and a good introduction into PhD studies. Social life. The feeling of "achieving" something.'*
- *'replacement of supervisor during supervisors leave connections to others working in the same field basic support on technical matters'*
- *'Clarity of the research objective from the very start, and supervisor's backup to this objective all the way through. When you start on a PhD you do not have the ability to choose the right supervisor, as every employee at AAU would like to supervise so as to get the budgeted hours for it, but not necessarily having any interest in the project as such.'*
- *'Lacking involvement from supervisor #1 - The Doctoral school seems to favour the supervisor and taking his/her part instead of making a balanced approach to the persons involved in the problems.'*

Content

- *'A clear defined goal'*
- *'I think that we should be forced to learn some sort of theory of education in order to be better prepared for this task. It is strange that you have to study for 4 years to be a normal teacher but when you are a PhD student you can go right ahead and give lectures'*
- *'specific courses related to my field of research'*
- *'Lack of some more courses related to my research field. Not enough information about the administrative attribution of a PhD student. Example: looking and booking flights or hotels for conferences, filling out forms for different reasons, etc.'*
- *'Better dissemination of results to the public.'*
- *'Program courses relating to my project (this is due to the fact that there are very few students working in the same field)'*
- *'More guidance for the research from the theoretical point of view. The goal is too much project oriented where the theories are not so important compared to the practical results. But for the PhD thesis, the theoretical reasoning and analysis are the most important. I am afraid that my PhD work will lack the theoretical aspect, or that I will not have time to complete this aspect during my contract.'*

Culture

- *'Danish language Danish political and culture understanding Some interesting PhD courses'*
- *I am too busy that I do not have enough time to learn Danish.'*
- *'Not having teaching opportunities for me due to lack of availability of teaching in English at my department. This has been a cause of worry through out of my PhD period. This created a feeling of insecurity within me and due to this some misunderstandings got developed with my second supervisor. I think which was unfortunate. I feel that my department is really not ready to facilitate well to international students especially with the matter of teaching. Due to not having teaching Aalborg University my doors for further career growth at the Aalborg University are almost closed. I feel very sad about it as I like Aalborg University very due to its strong emphasis on trans-disciplinary research.'*

Time and money

- *'Time to do my PhD!'*
- *'The ability to focus on one thing at a time. There's a tad too much multitasking going on and too many balls in the air and that disturb your ability to emerge yourself deeply in a subject for enough time to gain from it.'*
- *'A period of time specifically for knowledge collecting'*
- *'Better financial support for experiments and external courses.'*
- *'Higher salary'*

Practicalities – start

- *'I spend the first few months in a suboptimal office without a PC, so a quicker office setup.'*
- *'More formal guidelines in the beginning.'*
- *'So far, I guess the main things which have been missing are: Formalized introduction (getting to know the University system takes a long time when you have to start from scratch), knowledge/experience sharing, social events.'*
- *'A better welcome (introduction to life at the university, teaching, rules etc.)'*
- *'structure in the first month of the study'*

In addition, 99 student respondents specified their suggestions at the end of the questionnaire. Selected answers are listed in the following. Most of the replies are related to the issues of supervision and community and a few of them concern introduction, contents and culture.

What suggestions do you have regarding how to improve PhD supervision at AAU?

Supervision

- *'Supervisors should have a limited number of PHD students (maybe no more than 5), so they have more time for each of them'*

- *'Evaluate and rate PhD-supervisors! Calculate how many PhD-students the supervisor has taught - and what these students are doing now. Consider making this knowledge available to the potential PhD-students ...*
- *'Evaluation of supervisors to ascertain that they are qualified Course for new supervisors Supervisor - student contracts'*
- *'Define *clearly* what responsibilities a supervisor has, and then leave him to do his work.'*
- *'Require all supervisors to take some basic course in supervision.'*
- *'Try to strengthen the connections between supervisors and students somehow'*
- *'A new person should be employed at the group who is a really supervisor, someone who knows what each one is doing and is really interested on it. The current professors/assistant professors/associate professors are just not good enough at that.'*
- *'More guidance in the start up of the project. It takes a lot of time to get into the practical and theoretical issues. I think a closer co-operation could speed up the process quite a bit.'*
- *'Never assign just one supervisor who is not familiar with the field and who has no research interest himself.'*
- *'1) A mandatory course for all supervisors in the rules for being a supervisor at Aalborg University. 2) A meeting every 6 months including the PhD student, the supervisor(s) and an independent departmental committee (3 members; one with knowledge of the formal demands and two with knowledge of the field of work [i.e. departmental head or other, PhD coordinator and one from the section in question with specific knowledge]) in line with what is seen at many universities in the US, the UK, Canada and other parts of the world. This would force out issues that are normally kept from the departmental knowledge by the supervisor and/or student and force openness about the progress of the study.'*
- *'guidelines for supervision'*
- *'Supervisors should be given some courses on how to value students. This is seriously lacking in my direct supervisor. They also need to know how to communicate with people and how to encourage students in pursuing the PhD work.'*
- *'Selecting academic qualified and righteous teachers as PHD supervisors.'*
- *'Courses on coaching/personal development to make supervisors proficient leaders/mentors. Supervisors should motivate the young researcher and show interest in their work. You should not be a supervisor if you cannot manage to put in the effort and time needed - maybe some rules for this?'*
- *'weekly contacts with supervisor weekly supervised PhD groups within same interest areas'*
- *'-Make a "master plan" of the PhD WITH the supervisor as soon as possible - Supervisor contracts outlining expectations -Clarification of the difficulties experienced at different stages by PhD students, what could be done about it, and what the demands to the supervisor are.'*
- *'standards about meetings with the supervisors regularly'*
- *'Maybe restrict the supervisor number to be equal or less than two.'*

- *'The assignment of supervisor has to be done by a board of researchers/academics internal and/or external to AAU, who are very familiar with the research topic. Both the PhD student and the supervisor have to be evaluated 2-3 times during the project, to ensure that everything is on track.'*
- *'Firstly to make the course in PhD supervision mandatory to supervisors Secondly to demand that they hold a PhD degree themselves Thirdly to take the paper flow between the Doctoral School and the supervisors seriously and see it as a sign of that something is wrong if the flow is not continuous - for instance I did not received the 6 months evaluations for a year and it was not until I contacted the Doctoral School that anybody noticed.'*
- *'A regular meeting with another "censor" likes lector with experience within the field. More well defined rules for teaching responsibilities Relevant PhD courses or no courses.'*
- *'Supervisor should take contact regarding the Ph. D work and progress.'*
- *'Allow students to higher degree choose supervisor independently of project (if industrial) leader; some control of supervision; motivate supervisors to give more time for students'*
- *'-PhD supervision at AAU is very good already.'*

Community

- *'More critically assess what research environment is qualified in educating PhD-students.'*
- *'Encourage communications and experience sharing between PhD students. Organize more gatherings within research group and between groups.'*
- *'Much more orientation of the students of what kind of help is available during the study; time and form of supervision, opportunities to meet other PhD. students, orientation about if PhD. networks exist at AAU'*
- *'More collaboration between departments. Additional information to PhD students that are not enrolled on the official program so that they may take advantage of experience from other students.'*
- *'Always provide a possible project for the student to start out with, and such a project should be something that the supervisor sees a potential in, something that could easily evolve into a full thesis.'*
- *'- organization in research groups with regular meetings for discussion of related research for support of more collaboration - ironically the synergy effect, which has been supported by group-work at AAU, is non-existing, when it comes to research (at least in my department)... An effort to promote that should be made in my opinion.'*

Content

- *'Start a PhD only if you know what you will be working on for the next 3 years and avoid industrial PhDs. A new format of PhDs with 2 students should be created. I never so good about my skills and never worked as well as when I studied on my Master thesis with another student.'*
- *'End with industrial PhD positions. Increase freedom in research.'*

- *'Start up a PhD program with a main goal that could be achieved by several individual but relevant PhD projects. This would create a well functioning research group that each of its members could help each others to achieve their respective PhD tasks.'*
- *'To have the PhD work more problems based like the master students are. That way of learning is a very nice way.'*

Introduction

- *'there should be an instance where you're presented to your supervisor, and obligations of both, supervisor and PhD students are read, so both parts are aware of his rights and obligations.'*
- *'It is individual from person to person. I need more realistic time schedule 'An initial meeting with doctoral school, with specific questions regarding project plan (aims, applications, publications etc.). Better planning before the start of project could prevent a lot of enthusiasm and time from being wasted.'*
- *especially in the beginning things were drafting around with no start and no goal'*
- *'Introduction to new PhD-students Cross institutional events (might be social)'*

Culture

- *'Stronger recommendation of Danish language course and perhaps with some course in Danish Politics and Cultures.'*
- *'Clear statement what a PhD/amanuensis employment basis means. Is it realistic to work 3/5 of your time with the PhD, when teaching, supervising and designing courses? The PhD courses should be placed central during summer. PhD students doing teaching in CPH do not have time attending courses in Aalborg in a teaching term.'*
- *'Decrease the teaching load, (840 hours is a lot, on tree years especially when you are away in 6 months and you also need to have some time for the thesis writing. Teaching also takes more time than you get paid in the beginning) be more professional when you hire people, (have interviews), be more professional to inform the new Ph.D. students about there rights, and how the system works. (I have got no official information)'*

Appendix 2: General suggestions from PhD supervisors

At the end of the questionnaire for PhD supervisors, 11 supervisor respondents specified their comments and suggestions in general in the text boxes, as listed in the following.

- *'The best PhD students are those who have had real life (employment) experience outside the university before they got into the PhD study'*
- *'In general, the PhD students feel that they are in shortage of research time. I agree - less teaching and less PhD courses would be beneficial - e.g. reduced to 3-4 month each. (I know it is a problem on another level - but is important!)'*
- *'A further motivating factor on the production side would be pay-per-result, i.e. an extra bonus in salary if certain goals are met.'*
- *'My experiences with my PhD. students are very varying. Some of them are very willing to discuss and give me working papers for commenting (which I appreciate very much), whereas one or two have sort of withdrawn themselves from supervision and seem to have some sort of writing blockage.'*
- *'But give us the time to do it!!!'*
- *'I am a bit sceptical about the results of an enquiry like this one. Very often you are in doubt whether to cross out number 2, 3, or 4 among the 5 possibilities. The outcome is not very specific.'*
- *'I have attended such courses previously and relatively recently. They were good but I do not currently feel the need for more.'*
- *'I would like to participate in activities to improve the quality of PhD supervision. But the seminars that are held at AAU are designed by a small group of people who have their own specific agendas. These seminars are not open to input from others. I have made attempts to suggest changes or improvements to the education process for PhD students only to have them ignored, or given some obscure rule or university policy to shoot down the suggestion time and time again. Honestly don't think participation in these types of symposiums will help at all unless some serious effort is made to break down the use of cliques to make policy changes.'*
- *'I will probably not have PhD students in the future if I can avoid them. They are expensive and produce less research than post-docs. And certainly as I get most money from Industry it is Important that AAU perform for the money. Danes have worse skills today when entering the PhD study compared with students from abroad, and are not so willing to pay what it takes to adjust this. Cut downs on the educational system in general and changes on educations to accommodate student's desires for interesting and entertaining and easy lectures have lead to this. From my viewpoint if you want to improve life and quality of work for PhD students, then cut their salary by 50% to demonstrate that it is a study. Demand at least 2 International publications from them as part of their PhD study. International publications will also show that the level is OK for an adjunction committee and the PhD student will receive feed back from others than his supervisor and experience what level is necessary for good research. And maybe learn to appreciate the skills of the PhD supervisor who has experience in public.*

The PhD students should not teach 20%as now, but only have obligations related to the Department like showing new PhDs how to use equipment, and a minimal teaching load just to try it. Regarding the PhD courses - they are waste of time in general, except for 1-2 modules that might be relevant (writing a scientific paper e.g.). They should be an offer, not mandatory. Better if they wrote a paper for a journal.'

- *'Q29 was too biased in the formulation. There are ALWAYS some of these types of problems in the collaboration, but in general they are handled along the way - so it would be interesting to learn more about the coping strategies'*
- *'Time constraints of supervisors! Teaching, project management, administration, etc.'*