15

Supervision of Students with Structured Student-centered Teaching

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Introduction

The quality and quantity of student supervision is often the key to successful graduate/postgraduate research. Typically supervision is viewed as merely a teaching relationship between the student and the supervisor during a given research project. The relationship, in most cases, does not follow a generic template but is formed on the teaching/learning activities carried out by the supervisor and the student. Students will usually be different and for a supervisor the relationship will therefore inevitably change on a student-to-student basis. These differences might be rooted in e.g. background knowledge, degree program, gender, age and nationality/cultural background which all, to some extent, affect the level of learning for individual students (Le & Tam (2007); (Calma; 2007)). Other differences in student learning, which should ultimately lead to different modes of supervision, come from student motivation and expectations. Student motivation ideally stem from curiosity about and general interest in the project. However, some students are only interested in getting their ECTS in the easiest possible way, and for them learning will be much harder and "shallower". The supervisor's job is therefore to induce enthusiasm for the project in the students, resulting in commitment from the students and ultimately a great project. As for student expectations, the student may expect the supervisor to help them every step of the way, or they may simply expect guidance at critical points in time during the project. Here, the supervisor needs to adjust the level of help to the individual student, so that every student will solve as many of his/her questions as he/she is capable of on his/her own.

In the department of Plant Biology and Biotechnology at Faculty of Life Sciences, University of Copenhagen, the supervision of students follows a contract which specifies project objectives, duration and location, frequency of supervision and covered subject areas. Such a contract not only adds a structured format to the research project but it also serves as an agreement on what to expect from the supervisor and the student during the project. In general, it might be naive to think that student supervision can be fully contained in a simple contract as the one used at LIFE. Particularly it might be questionable whether a contract-based supervision can be used for all students and supervisors with the same level of success especially considering the different backgrounds of students and supervisors. Also, this contract is not applied for international students where supervisors are not required to fill out anything accept the final examination form.

In this paper we examine how structured supervision helps and encourages students to learn in a research environment. The purpose was to assess how students view good supervision with respect to quantity and quality. In addition an investigation was made into whether a structured supervision format can be used successfully for students with different backgrounds. We focused on students that differ mainly by being national/international, inexperienced/experienced and doing projects that require little laboratory work/much laboratory work. The aim of the project was to create inspirational material for future student/supervisor relationships within Department of Plant Biology and Biotechnology at Faculty of Life Sciences, Copenhagen University.

Materials and Methods

Two Biotechnology students from LIFE, Copenhagen University, Andreas and Geziel, formed the basis of our study. They were supervised from the middle of April until the middle of June 2010 (around 8 weeks) in connection with a bachelor and an independent research project, respectively. The "size" of both projects was similar, amounting to 15 ECTS. Andreas was a Danish bachelor student aged 21, who started his studies in 2007 and was supervised by Rubini. Geziel was an international student aged 23 from Brazil, who started his studies in 2006 and was supervised by Mika. Both supervisors were superficially involved in the supervision of the other student, to avoid too much bias in the conclusions. The titles of the projects were: Effects of light and dark-treatment on cyanogenic glu-

coside metabolism in cassava (Andreas), and CYP405A2: Characterization of three novel non-coding regions in *Zygaena* burnet moths (Geziel). Although the project duration was similar in both cases, the structure was different. Andreas spent only three days on laboratory work and the remaining 7.5 weeks reading and writing his project. In contrast, Geziel spent 7 weeks on laboratory work and one week reading and writing his project.

The project outlines were defined in collaboration with the students and presented to them with Intended Learning Outcomes (ILOs) at the beginning of the project (Appendix A-B). The ILOs were designed using different levels of the SOLO (**S**tructure of the **O**bserved **L**earning **O**utcome) taxonomy (Biggs & Tang; 2007). We also presented the students with questionnaires before, during and after the project to asses how our supervision was evolving and if the students' view of our supervision changed during the project (Appendix C-E). The students were also asked to relate to the ILOs in the questionnaires (Appendix C-E). In the first questionnaire the students were to address factors they considered important to achieve their ILOs. In addition they had to state, in the beginning and midway through the project, if they felt the ILOs would be achieved upon completion of the project. After finishing the project the students were asked to reflect on whether they had obtained the ILOs. Midway through the project the students were formatively evaluated based on a project progress report which they submitted. This was used to assess the progress of the students toward the ILOs. If the students' progress was not satisfactory the teaching activities were adjusted accordingly to help the students attain the set outcomes by the end of the project. A summative evaluation was carried out at the end of the project where the students were given a grade in an oral examination on their project. After examination an informal interview was carried out to obtain the students' view on the whole project as well as the supervision process.

Both students received a "welcome package" on the first day of their project including the following:

1. Detailed project outline.
2. Small relevant paper collection.
3. Dates with structured supervision (approximately once a week).
4. ILOs.
5. First questionnaire.

Structured supervision was a meeting of 0.5-1 hour where the student and supervisor discussed issues/questions, which the supervisor would have

received in writing from the student no later than 2 hours prior to the meeting. During the weeks with laboratory work the student wrote up to half a page of progress report from the preceding week and this would also be discussed in the meetings. Day-to-day supervision were short informal meetings where students mainly asked specific questions about laboratory work and/or writing.

Results

Both students completed their projects on time, passed their oral exams, filled out all questionnaires, and participated in the final interview relating to this pedagogic project. In general, Geziel appeared to be very self sufficient and good at seeking information on his own during the laboratory work. In contrast Andreas, due to his inexperience, was less comfortable on his own and in the beginning relied more on help from his supervisor. After the initial guidance he became more confident and was capable of doing work independently in the laboratory.

During the writing phase there were also distinct differences between the two students. Andreas experienced several problems and found it difficult to adapt to writing on a scientific level that he was not previously used to. As a result he had underestimated the time needed for writing and ended up submitting an incomplete report. During the project he was asked to develop a plan so he could structure his writing, but this was not successful, since he was unable to do so. Geziel also had an issue with time during the writing phase, because the original two weeks set aside for writing were cut down to one week, as he decided to focus his attention on finishing the laboratory work. This turned out to be a bad decision, since the report was not as good as it could be, although it had all the necessary elements.

When defending the project work at the final examination, Andreas had some difficulties communicating his results at the proper scientific level, and this was received poorly by the examination committee. He had received guidance on how to prepare for his defense, but this may not have been clear. Geziel, on the other hand, presented his work at an appropriate scientific level, but he did not use his allocated time optimally, since he spent a lot of time on irrelevant details. Andreas acquired 7 and Geziel 10 as their final grade, which both students were very satisfied with. The supervisors also felt that the grades were justified, given the work produced during the project, and the students' presentations at the final examination.

Summary of the interviews after examination:

Andreas: The most fruitful experience Andreas had in his relationship with his supervisor was the practical training in the laboratory. He especially found the discussions concerning experimental procedures, instrument operation, and safety measures very useful before his laboratory work. This gave him the necessary security and confidence to work freely/independently in the laboratory. Andreas felt that he had received good constructive feedback on his writing, allowing him to learn and develop his scientific writing skills further. During the data interpretation he found it very useful that the supervisor guided him with questions so that he could analyze his data in a meaningful way. He was generally encouraged by his supervisor and found it inspiring to work in an environment where people were very knowledgeable about his topic and could help him when problems arose. He had underestimated the extent of the writing phase and would have liked more help, early in the project, in planning and structuring his writing. Generally he was very satisfied with the structured supervision and also surprised with the easy accessibility to his supervisor and the quick responses that he received on questions and feedback.

Geziel: Geziel was generally very pleased with the supervision of his project. He thought his supervisor had provided help whenever it was needed and/or directed him to where he could find answers to his questions. He had received good encouragement and perceived that communication had been easy between himself and his supervisor. He did not feel that anything was lacking in his supervision, but he would have liked a little more help with a certain aspect of his project (designing his primers) in the very beginning. He thought, that if he had been handed a paper on the subject and we had discussed the finished primers a little further, it would have been helpful. Geziel thought that the most fruitful experience he had with his supervisor was his observation of the excellent way she structured her work and her ability to multitask. He would try to adopt these strategies for his future studies and career. Generally Geziel gained a lot of experience from this project and he was very adept at pinpointing things that he wanted to improve in himself before doing another project.

Discussion

As observed from figure 1, Andreas and Geziel had some fundamental differences which have to be taken into account when evaluating the outcome

Answered questionnaire	Andreas			Geziel		
	Beginning	Midway	After completion	Beginning	Midway	After completion
1. Question about supervision						
A. I have as much supervision as I need	Agree	Fully agree	Agree	Fully agree	Fully agree	Fully agree
B. I have high quality supervision	Fully agree	Fully agree	Fully agree	Fully agree	Fully agree	Fully agree
C. I expect my supervisor to answer all my questions/did answer all questions	Fully agree	Agree	Fully agree	Disagree	Disagree	Fully agree
D. I expect my supervisor to help me find my own answers to my questions	Agree	Agree	Fully agree	Fully agree	Fully agree	Fully agree
F. *Your definition of good supervision*	A good supervisor gives "feedback" to questions in the form of counter questions and hints/tips about where the answers might be found	A good supervisor has a good talk/discussion with the student before the actual lab work. With emphasis on how to carry out the work and what safety measures to take	A good supervisor is a good listener who also puts a certain amount of pressure on the student in order to fulfill all the deadlines. A person who warns about "time traps" like how much time different tasks (e.g data handling and writing) may take	I envision a supervisor as one who alights and propel a personal interest/ passion. I see him/her as a partner in the pursuit of knowledge	I would call it an "integrative" supervision where the interests of both student and supervisor are balanced towards the proper development of the project and the experience of the student	None
F. I expect to get most supervision during the following phases	Laboratory work, Writing phase, Data interpretation, Definition of project, Preparation for final examination	Laboratory work, Data interpretation, Preparation for final examination, Writing phase, Definition of project	Laboratory work, Writing phase, Data interpretation, Definition of project, Preparation for final examination.	Data interpretation, Writing phase, Laboratory work, Definition of project, Preparation for final examination	Data interpretation, Definition of project, Writing phase, Laboratory work, Preparation for final examination	Definition of project, Laboratory work, Data interpretation, Writing phase, Preparation for final examination
G. I think good supervision is essential for getting a good final grade	Agree	Neither agree nor disagree	Neither agree nor disagree	Neither	Disagree	Agree
H. I prefer my supervisor to be:	My friend, My boss	My friend, My boss	My friend, My boss	My friend, My boss	My colleague	My friend
I. I get most out of the following type of supervision	None	Day to day and structured weekly supervision. Depends whether the supervision is during the lab work or during the writing phase	Structured weekly supervision	None	Structured weekly supervision	Day to day supervision
J. Comments to day to day supervision and structured weekly supervision	None	The day-to-day supervision was especially useful during the laboratory work. Particularly for safety instructions and how to book and run various instruments. Weekly supervision was useful for the writing phase. It allowed for small deadlines and help to avoid write blockade and waste time on wrong focus points	It is good to have the weekly supervisions, especially in terms of deadlines. In my case a demand for a finished introduction should be made prior to accepting me as BSc. student	None	In a day-to-day supervision you get the chance to constantly obtain a follow-up and feedback from the supervision (good point), however you barely have time/space to experiment and try by yourself (bad point)	It is good to have a close participation. The supervisors experience may avoid some problems
2. Question about your project/grade						
A.I like my project outline	Agree	Fully agree	Agree	Fully agree	Fully agree	Fully agree
B.I think I will have some problems with my project in the following areas:	None	Writing due to inexperience	N/A	None	Laboratory work (I wish I had ideal primers. I will have to work a lot on that matter)	N/A
C. I think my grade was:	N/A	N/A	As I deserved	N/A	N/A	As I deserved
D. I had problems with my project in the following areas:	N/A	N/A	Writing. Takes time to adapt to a new way of writing projects where you focus on usable results and not on what went wrong. And also adjusting to citing scientific literature properly.	N/A	N/A	Writing (I did not plan and structure my schedule enough to have enough time for writing)
3. Question about your ILOs						
A. I have achieved many/some or all of my ILOs and will achieve the rest	N/A	Agree	Fully agree	N/A	Neither	Agree
B. Why I will or did fail some ILOs (if this is the case)	N/A	None	None	N/A	I am still in the primer improvement phase	Some of the primers did not work
C. What I *need/needed* from my supervisor to achieve the rest of my ILOs	N/A	None	None	N/A	Patience	None
4. General questions						
Obataining a "welcome package" has been helpful for my learning	N/A	N/A	Fully agree	N/A	N/A	Agree
Being part of a pedagogic project has resulted in the supervision being	N/A	N/A	Better than normal	N/A	N/A	Better than normal
I will recommend this type of supervision to others	N/A	N/A	Agree	N/A	N/A	Agree

Fig. 15.1. Overview of answers to questionnaires (Appendix C-E) by Geziel and Andreas. Note: In question 1F, elements are ordered from 1-5 where 1 is most/best and 5 is least/worst. N/A: not applied

of the supervision process. Firstly Geziel is a little older and slightly further along in his studies than Andreas. Secondly he is from Brazil, showing that he has courage and initiative to go study in a country where culture and language may be a challenge, and very different from what he is used to. Accordingly, we would expect Geziel to be more self-sufficient than Andreas, and this was also what we observed. Furthermore their personalities differed a lot, Geziel being very confident while Andreas was more insecure, this of course contributing to the differences in the outcomes of their projects.

From the first questionnaire it was evident that both Geziel and Andreas liked their project outlines and expected no problems with it. This was not surprising since they were involved in creating the outline together with the supervisor before starting the project. They both had high expectations for the supervision, which can also be expected at the start of a project. Andreas expected his supervisor to answer all of his questions while Geziel, more realistically, expected his supervisor to help him find the answers. Andreas also thought that good supervision was important for the final grade while Geziel did not think that this was such an important factor. Here we see, that Andreas seem to put more of the responsibility for his project on his supervisors shoulders, while Geziel does not. Andreas and Geziel both believed that they would achieve their ILOs in the beginning of their projects. The answers from the questionnaires generally show the students' high expectations and satisfaction with their project, although it already is evident that Andreas is not as independent as Geziel, since he expects his supervisor to answer all his questions.

Midway through their projects Geziel and Andreas still had high expectations for the supervision, and again Andreas expected all of his questions answered by his supervisor, while Geziel expected help to find the answers by himself. At this point they both considered that supervision is not the most important factor for getting a good grade. This shows that Andreas is starting to take more responsibility for his own project. Andreas and Geziel were still very satisfied with their project outlines, but now Andreas has some concerns about the writing phase and Geziel about the laboratory work. This was mainly due to problems they experienced in these areas at that time. As a result both students now thought that they would not achieve all of their ILOs.

After completing their projects Andreas and Geziel were both very positive about the structured supervision, even though Andreas expressed regrets about not optimally utilizing all the supervision he was offered. An-

dreas reckoned that good supervision had less to do with his final grade while Geziel was of a different opinion and thought that it definitely influenced his grade. This might be explained by the different grades that Andreas and Geziel were given. Andreas was given 7 for a good performance which displayed a good command of the relevant material with some weaknesses. Geziel obtained 10 for a very good performance that displayed high level of command of most aspects of the relevant material with only minor weaknesses. A good grade might be perceived from the student's viewpoint as a result of excellent supervision, while poor/mediocre grades might be viewed as bad supervision or the student's own fault. The good grade could also have resulted in Geziel wanting to credit his supervisor more, as a way of saying "thank you". Both students felt that they had received a grade they deserved, and both pinpointed that they had most difficulties in the writing phase of the project, although their problems differed. Andreas could not easily adapt to writing on a scientific level and had problems citing scientific literature accurately. Geziel had not planned enough time for writing, when structuring the project, and could therefore not hand in the high quality report he had hoped for. This is a common pitfall when doing projects with much laboratory work, where both student and supervisor are highly interested in the results of the work. Conversely, in projects that involve little lab work, like Andreas' project, where only 2 weeks out of the 8 weeks are allowed for completion of practical work, the students will require more close supervision to ensure they finish the laboratory work on time as well as meet departmental requirements. In Andreas case the laboratory work was not an issue as he completed it within 3 days, and was well within the time frame. Both supervisors tried to help the students with their problems in the writing phase, but obviously failed partially, and will take this into account when supervising other students in the future.

In his supervisor's opinion, Andreas nearly attained all of his ILOs. In his progress report, submitted midway through the project, he had managed to reach ILO1-ILO6. This was impressive since he was not that experienced with laboratory work to begin with. He had some difficulties with ILO7, however, when he had to summarize his laboratory work into a comprehensive report. A major obstacle he faced was learning how to write at an appropriate scientific level. He was not used to writing reports, where you emphasize your successful results and leave out or tone down things that went wrong. In addition finding and citing original literature was also problematic as he had learned to do this differently (and incorrectly) in previous projects that he had done. In this respect the supervisor perhaps should have

stepped in much earlier during the writing phase to make sure that Andreas had understood how to cite literature accurately. During the final examination he found it difficult to communicate his knowledge from the project to his peers (ILO9). Although he was guided on how to prepare for his examination and told what was expected of him, he did not manage to utilize it during his project defense. The supervisor also offered to go through his presentation and give feedback before the examination, but he decided not to use this opportunity, which he regretted afterwards. Upon completion of the project, we discussed how Andreas could further improve in writing and communicating at a scientific level and this was received positively. All in all we think Andreas developed a lot during the project and gained valuable knowledge.

In his supervisor's opinion, Geziel achieved all of his ILOs, although we could have wished for him to have obtained a little more experience on working with the obtained sequences (ILO 4) and in communicating his knowledge from the project to his peers (ILO 8). As for ILO 4, there simply was not time, since Geziel was stuck for a long time optimizing primers. Geziel also regretted not having enough time for this phase of his project. For ILO 8, we think Geziel was very good at communicating his results during the project, but at the exam, he had a hard time getting to the point, and needed to learn how to structure a talk better. Some of this was due to nervousness, and we simply could not have predicted that Geziel would have this problem. We discussed the problem after the exam, and Geziel agreed that he needed to improve this aspect of his communication. Geziel also had some thorough reflections on the whole project and pointed out things he wanted to improve in himself before the next time he did a project. This showed his independence and great interest in improving his own performances to be able to pursue a scientific career. All in all we think Geziels knowledge gain from this project was very worth-while.

After reflecting on the entire project, both students thought that they had achieved the ILOs specified for their project. Also, having specific ILOs to relate to throughout the project was a convenient way for the students to do self-monitoring on how far they were in the learning process. In addition, it also allowed the supervisors to fairly assess the students during the formative evaluation and change teaching activities, if progress towards the ILOs had not been successful. Both students found this type of structured supervision very useful and thought that having fixed meetings, where the supervisor had prepared issues that the students wanted discussed, were very rewarding for their learning. Both Andreas and Geziel agreed that this struc-

tured supervision was better than what they had received during previous projects, and would recommend it to fellow students. Day-to-day supervision and structured weekly supervision was well-received by the students, although the day-today supervision was considered better during the phase with laboratory work, and the weekly supervision better during the phase with interpretation of results and writing.

When analyzing the questionnaires in general, it was apparent that Andreas was very focused on the situation at hand, and did not think long term, while Geziel was better at seeing "the bigger" picture. This probably stems from the differences in their experience and Geziels greater independence. To Geziel, a good supervisor is more of a mentor alighting interest in the student, who can collaborate closely with the student allowing the student to benefit from the supervisors greater experience and knowledge. To Andreas, a good supervisor is more a person who answers all questions and perhaps has some responsibility for the project. Here we see that students with less experience take less responsibility for their own project and expect the supervisor to take care of everything. Naturally these students will need more guidance than more experienced students, but it is also the duty of the supervisor to induce more self-confidence and responsibility in this type of students so they take ownership of their project.

Generally both students developed a lot during their projects and were aware of their own weak spots and how they could improve themselves before doing another project. Accordingly, we believe that our supervision approach was successful and will recommend it to colleagues in the future.

Conclusion

The way we structured our supervision was well received by our students, even though they were two very different persons. Since older students with more experience often will be more self sufficient during the project, the supervision has to be adapted accordingly. Therefore it is crucial for a supervisor to quickly get to know a students strengths and weaknesses to be able to supervise them for optimal learning during the whole project. It is also very important for the supervisor to show enthusiasm about the project to motivate the student, and get them through the "rough" spots with good cheer. Applying well-defined ILOs as part of the student supervision not only helps the supervisor align teaching activities accordingly, but it also helps the student to get an overview of what he/she is lacking in order to

complete the project. We realize that it is difficult to extrapolate results from this small scale study to general guidelines for supervision, but we think that the overall importance of structured supervision with well defined ILOs as well as a quick assessment of each individual students needs are applicable in any supervision scenario.

A ILOs Geziel

At the end of the project the student should be able to:

1. Follow protocols for laboratory work successfully.
2. Write a thorough and comprehensive laboratory book
3. Sequence genes of interest:
   A. Extract genomic DNA from Zygaena insects.
   B. Design primers for genes of interest.
   C. Carry out and optimize PCR reactions. D. Clone correct PCR bands.
4. Work on obtained sequences
   A. Construct alignments and phylogenetic trees from genes of interest and other insect genes.
   B. Reflect on genes of interest compared to known insect genes.
5. Use knowledge obtained during education to solve problems arising in the project.
6. Summarize laboratory work into a comprehensive project report.
7. Search and find relevant literature for project report.
8. Communicate knowledge from project to peers as well as lay-men.
9. Reflect on the whole project during the project as well as after exam, to pinpoint problems and try to solve them.

B ILOs Andreas

At the end of the project the student should be able to:

1. Design and setup experiment.
2. Follow protocols for laboratory work successfully.
3. Perform metabolite profiling.
   A. Extract metabolites (cyanogenic glucosides).
   B. Analyze LC-MS chromatograms.
4. Perform gene expression analysis of cassava genes involved in cyanogenic glucoside synthesis/breakdown.
   A. Extract and isolate total RNA from cassava.

   B. Synthesize cDNA from cassava mRNA.
   C. Analyze and quantify gene expression by performing real-time reverse-transcription PCR.
5. Reflect on the relationship between cyanogenic glucoside amounts and gene expression levels of relevant genes in relation to experimental design.
6. Use knowledge obtained during education to solve problems arising in the project.
7. Summarize laboratory work into a comprehensive project report.
8. Search and find relevant literature for project report.
9. Communicate knowledge from project to peers.
10. Reflect on the whole project during and after exam, to pinpoint problems and try to solve them

C First, middle and last questionnaires

First questionnaire

General questions:

A. Age:_____
B. When did you start your studies (year):_____
C. Have you attended other further educations prior to the present one?
   Yes ☐
   No ☐
   If yes, which one? _____
   If yes, how long were you doing this other study?_____

1. Questions about your project:
   A. I like my project outline
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. I think I will have some problems with my project in the following areas:
      Lab work ☐
      Reading ☐
      Writing ☐
      Other:_____
      Specify problems:

2. Questions about your expectations of supervision:
   A. I will have as much supervision as I need
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. I will have high quality supervision
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   C. I expect my supervisor to be able to answer all my questions
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   D. I expect my supervisor to help me find my own answers to my questions instead of answering them all
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   E. Your definition of good supervision:
   F. I expect to get most supervision during the following phases (use numbers 1-5 where 1 is most supervision and 5 is least):
      Definition of project ☐
      Laboratory work ☐
      Data interpretation ☐
      Writing phase ☐
      Preparation for final examination ☐
      Other:_____
   G. I think good supervision is the most important factor for getting a good final grade on my project
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   H. I prefer my supervisor to be:

My friend ☐
My boss ☐
My college ☐

3. Questions about your ILOs:
   A. I will achieve all my ILOs
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐

4. Comments:

Middle questionnaire

1. Questions about your supervision:
   A. I have as much supervision as I need
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. I have high quality supervision
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   C. I expect my supervisor to be able to answer all my questions
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   D. I expect my supervisor to help me find my own answers to my questions instead of answering them all
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   E. Your definition of good supervision:
   F. I expect to get most supervision during the following phases (use numbers 1-5 where 1 is most supervision and 5 is least):
      Definition of project ☐
      Laboratory work ☐
      Data interpretation ☐
      Writing phase ☐
      Preparation for final examination ☐
      Other:_____
   G. I think good supervision is the most important factor for getting a good final grade on my project
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   H. I prefer my supervisor to be:
      My friend ☐
      My boss ☐
      My college ☐
   I. I get most out of the following type of supervision
      Day to day supervision ☐
      Structured weekly supervision ☐
      Other:_____
   J. Comments to day to day supervision and structured weekly supervision (good or bad things about both?)

2. Questions about your project:
   A. I like my project outline
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. I think I will have some problems with my project in the following areas:
      Lab work ☐
      Reading ☐
      Writing ☐
      Other:_____
      Specify problems:

3. Questions about your ILOs:
   A. I have achieved many/some of my ILOs and will achieve the rest
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. Why I will fail some ILOs (if this is the case):
   C. What I need from my supervisor to achieve the rest of my ILOs:

4. Comments:

Last questionnaire

1. Questions about your supervision:
   A. I had as much supervision as I need
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   B. I had high quality supervision
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   C. My supervisor was able to answer all my questions
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   D. My supervisor helped me find my own answers to my questions instead of answering them all
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   E. Your definition of good supervision:
   F. I got most supervision during the following phases (use numbers 1-5 where 1 is most supervision and 5 is least):
      Definition of project ☐
      Laboratory work ☐
      Data interpretation ☐
      Writing phase ☐
      Preparation for final examination ☐
      Other:_____
   G. I think good supervision was the most important factor for getting a good final grade on my project
      Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
   H. I prefer my supervisor to be:
      My friend ☐

My boss ☐
My college ☐

I. I got most out of the following type of supervision
Day to day supervision ☐
Structured weekly supervision ☐
Other:_____

J. Comments to day to day supervision and structured weekly supervision (good or bad things about both?)

2. Questions about your grade:
A. I think my grade was:
As I deserved ☐
Too high ☐
Too low ☐
Why was the grade not as you expected (If this was the case)?

3. Questions about your project:
A. I liked my project outline
Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
B. I had some problems with my project in the following areas:
Lab work ☐
Reading ☐
Writing ☐
Other:_____
Specify problems:

4. Questions about your ILOs:
A. I have achieved all of my ILOs
Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
B. Why did I fail some ILOs (if this is the case):
C. What could my supervisor have done to help me achieve all of my ILOs:

5. General questions:
A. Obtaining a "welcome package" which includes project outline, relevant papers, supervision schedule and ILOs has been helpful for my learning:
Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐
B. Being part of a pedagogic project has probably resulted in the supervision I have obtained being:
Better than normally ☐
The same as normally ☐
Poorer than normally ☐
C. I would recommend this type of supervision to a friend who was about to start on a project
Fully agree ☐ Agree ☐ Neither agree nor disagree ☐ Disagree ☐ Fully disagree ☐

6. Comments:

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2009-2-1/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2009_vol2_nr1_bibliography.pdf/