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Formative assessment of Bachelor and Master student's supervision

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Formulation and Justification of the topic chosen

One of the most challenging parts of student's supervision is to have the ability to formulate a good assessment. This one should help students to realize how much they have learned and, consequently, to the supervisors to improve their teaching skills (1, 2, 3).

In my research field, we interview students before we accept them in the laboratory under our supervision. During the interview we have the opportunity to know about students' background, expectations and social environment. Based on this information, the supervisor can adapt the contract and intended learning outcomes (ILOs) in order to get the best alignment.

The challenge pops up in the assessment of students. They are formally assessed on a report and a defense of their thesis, but generally they miss a formative evaluation while they are in the laboratory performing experiments. Consequently, I have found really interesting for my final project of the Universitetspedægogikum course to focus on activities that can improve this part of the supervision in a research group.

Description of the experiment

I will supervise one bachelor and one master student during block 4 together with Professor Stine Falsig Pedersen (I will do 75% and Stine 25% of supervision, respectively). For both students, and in agreement with the other supervisor, I would like to implement several assessments along the

block that will allow us to follow the scientific skills progress that students should learn in order to reach the ILOs.

The activities programmed for my supervision are the following: first, one individual meeting with each student; second, several assessments as experiment designing, meeting or exam preparation; and finally, exam evaluation. As described in the following points:

(a) One individual meeting:
- The ILO of this early starting individual meeting is to align the main learning objectives of students and supervisors.
- To achieve this goal, we will talk about our own expectations, student's supervision needs and learning objectives.
- This meeting is very important in the sense of establishing main points and getting agreements in the main terms of daily supervision. This meeting will also be very relevant to know the background and social environment of the students.

(b) Assessments:
- The ILO of these assessments is to motivate the students to get a deeper understanding of the laboratory techniques and better knowledge of the project. Each assessment shows several specific ILOs that will help to reach the general one. The specific tasks are described in detail for each assessment.
- First assessment – Experiment designing.
  - Both students should review 10-15 papers of the literature focusing in the techniques that have being used. These papers have been chosen considering its relevance for the project. (ILO - get familiar with the scientific literature)
  - Extract conclusions from previous studies by former laboratory members in order to use the information for new experiments. (ILO - learn how to be critical with previous studies and be able to analyze results)
  - Elaborate a working plan for the experiments that they will perform in the laboratory and discuss with the supervisors. (ILO - be able to organize their own experiments and explain the decisions with the supervisors)
  - The Master student should lead the literature search and discussion due to the experience and the higher level of exigency that we should have with this student. (ILO - improve the teamwork skills and leadership of the master student)

- Second assessment – Meeting preparation.
  - Both supervisors and students will meet every two weeks after the first month of working.
  - The objective of these meetings is to train students in data presentation, discussion and criticism of their own performance in the laboratory. (ILO - be able to present their data in a scientific format and improve their scientific skills)
  - During the meeting, students should be able to present and explain their own results and the biomolecular techniques that they have been using to get the results. They should also be able to discuss with the supervisors about future perspectives of the project and new experiments. (ILO - improve their data analysis skills and their understanding of the project. The demand level will increase as far as the project evolves)
- Small assessments – Deeper knowledge of biomolecular techniques.
  - During my daily supervision, I will ask to the students basic questions that they should answer to improve their knowledge about basic biomolecular techniques (as buffer composition, basic biomolecular concepts, etc). These assessments should be answered in an informal meeting the next day (or as soon as possible) in order to discuss about the technique and apply this knowledge in the consecutive experiments. (ILO - motivate and provide them with more tools to modify protocols gaining deeper understanding of basic biomolecular concepts)
- Exam preparation – Meeting to prepare the oral exam.
  - In this meeting, we will go through essential concepts that students should have learned during the time in the laboratory. They can do a rehearsal of the presentation that they would prepare in order to fix small mistakes and improve their presentation skills in a relax atmosphere. (ILO – give the students feedback about their learning and reinforce the main concepts)

(c) Exam evaluation:

- I will prepare several questions with varying difficulty level in order to evaluate the learning acquisition of the student. Both open and closed questions will be design to get a better picture of the student strengths and weakness (4, 5, 6).

- Another important focus will be to coordinate the focus and the duration of the exam. In order to achieve that I will discuss with the other supervisor about the questions that I have prepared and about the structure that exam should have.
- Additional goals during the exam will be to create a relaxing and safety environment for the student. To achieve this, I will follow the next points:
  - Explanation of what will happen during the exam, by describing its structure to the student at the beginning of the evaluation.
  - Creating a pleasant and friendly atmosphere with constructive comments about the presentation and the written report in order to break the ice. Also I can introduce some inquiries with a general context and breaking down the difficult questions if the student requires it.
  - Using starting questions with low level of exigency to get a more relaxing atmosphere (easy opening; 4, 6).

Development of the experiment and discussion

- As the individual meeting we have used the interviews of students as a platform to talk about students' background and expectations. We also talked about their specific projects, our expectations for their performance, and what they could expect from us. In this particular case, and because both students worked at the same project and learned at the same time the techniques, we also had an initial meeting with both of them. As an outcome of this meeting we made an agreement about the supervision. The conclusions of the meeting were:
  - They would work independently as soon as possible.
  - They would share experiments at the beginning of their projects until they have learned the biomolecular techniques to work alone in the laboratory.
  - I would be the daily supervisor and we would have meetings with both supervisors every 2 weeks.
  - They asked for a close supervision at the beginning and more freedom at the end (request that was in agreement with supervisor's expectations).

  - Both students looked very enthusiastic and motivated with the topic of the project and the supervision plan.

- Regarding the assessments, they helped to improve the students' skills in experiments designing and meeting preparation. In particular, the first assessment was more challenging for them due to the lack of familiarity with experiments designing based on literature and previous studies. In order to provide some guidance, I gave them multiple examples of protocols, previous master theses and several relevant papers to assist them in the broad literature of the project. We had also several short meetings discussing protocols in order to highlight the good performance and the important points that needed some improvement. The meeting preparation assessment improved their scientific skills by presenting their data in every meeting. In the last ones, in the case of the Bachelor student, she was able to discuss the results and suggest new experiments that the Master student should continue. In both cases, they were able to work with certain grade of independence in the laboratory when the tasks to carry out were well defined. Unfortunately, in the case of the small assessments they did not look very useful or very pleasant for the students. I decided to let them choose if they want to get insight into deeper knowledge or not without any consequences or pressure.
- Concerning exam preparation, I helped the bachelor student to prepare her exam a week in advance. It was an intense session where we discussed the important concepts that she should know and how to improve her scientific vocabulary in order to explain the concepts and results that they have obtained during the 3 months. In my opinion, this meeting was really fruitful and helpful even though the student told me that she had a recent personal difficult situation that prevented her from focusing on the exam.
- Finally, I was the co-censor of theorical part of the PUK exam of my bachelor student (before she started with the laboratory practice) and the co-censor of another bachelor external student (in this case evaluating the last defense of the project). In both cases, but especially in the last one, I was able to achieve the three main points of exam evaluation explained in the experiment description (evaluation by open and closed questions, management of exam time, and creation a safe exam atmosphere). Before the exam, I had a meeting with my departmental supervisor (co-censor in the exam) in order to adjust the time and the level of the exam; and after the exam, to get feedback about my per-

formance. Both meetings were really helpful for me and allowed me to improve myself efficiency. The conclusions were that I was able to create a relaxed and safe atmosphere during the exam, being clear about the pace of the exam and creating a good balance between questions that the students could fully answer, and more difficult questions. In addition, I had a very good understanding and use of the principles of teaching for higher education and grading system.

Considerations on the outcomes of the experiment and future ideas

In my opinion, most of the experiment was really successful and helpful for the students and for me as a supervisor. The formative appraisal of the students facilitates us to follow better their achievements and adjust the level of exigency without losing students motivation. On the other hand, the small assessments were not entirely accomplished. The students did not show interested for them. In the future, because I consider that these small assignments will help in higher degree the learning process of the students, I will improve them as follow:

- Showing the students future relevance of the assignments, what they can learn from them.
- Emphasizing the scientific and medical context of the assignments.
- Inviting the students to be more involve in the formulation of these assessments choosing the way to present them and saving part of the meeting time to discuss them.

Finally, I would like to implement a written evaluation of my supervision. The conclusions from this project have been taken from informal discussions with students and my supervisor but a written feedback will help me to evaluate my weak and strong points with the intention of improving myself efficiency. Furthermore, I think it would be a good exercise for the students to evaluate my supervision and participate more in their own learning process.

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