

Supervision of a Master's Thesis: Analysis and Guidelines*

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Abstract—We discuss the supervision of undergraduate students conducting their master's project ("examensarbete"). We base our reflections on both literature studies and insight into practical experiences, gained in an interview with an experienced supervisor, and aim to identify guidelines for successful supervision.

I. INTRODUCTION

The main qualification for taking on a supervisory role in a research environment used to be holding a degree or an equivalent research experience; the logic behind this being "if one can do research then he can presumably supervise others to do the same". This presumption was widely questioned in the 1980's [5], concluding that effective supervision is important for qualitative research work in terms of producing a high-quality thesis, completion in time, dissemination to the subject community, and also preparing the candidate for a related future career. Hence, supervision should not be simply regarded as an adjunct of doing research, but rather as an area of professional practice by its own, alongside with performing research, administration and teaching, to be the fourth leg of the metaphorical stool that defines the professional practice of an academic.

In this work we investigate the supervision of undergraduate students through doctoral students and postdoctoral researchers. We aim to make prospective supervisors aware of the common challenges that can arise during the course of supervising a research work and discuss techniques used to overcome these challenges. To this end, we apply the available literature on graduate student supervision to the supervision of undergraduate students carrying out their (Swedish) master's project in the areas of technology, engineering or science, and summarise an interview with an experienced supervisor from which we gained insight into the matter from an independent practical perspective. Our main topics are the roles and relationship of supervisor and supervisee, as well as the expectations that both will bring into the process of a master thesis project.

II. THEORETICAL BACKGROUND

A general model for the supervision of doctoral students describing the attributes and qualities of an effective supervisor and predicting the outcome of effective supervision on research students was proposed by Taylor and Beasley [5].

Another generic model applicable to almost any supervisory role, dealing with ethical issues regarding the supervision situation and designed to protect the student's (supervisee's) rights, is the "University of Oslo ethical model" [8].

However, we focus further on more specific models regarding roles, relationships and expectations.

A. Roles and relationship

Like in any relationship supervisor and supervisee fill specific roles. These roles can be expressed by role pair metaphors along a gradual decrease in asymmetry with respect to power and control, and an increase in autonomy like *master - servant*, *teacher - pupil*, *project manager - team worker*, *colleagues* or even *friends* [3(pp.120-122)]. Another approach can be to set up metaphors for the project like "creating in the kitchen", "digging in the garden" and "bush walking" [1]. These three models strongly enhance autonomy of the supervisee. The first model is a close work relationship, but with a clear leadership of the supervisor. In the second model, the most loose relationship, student and supervisor do not work together, and the student receives only advice. The last model is the closest relationship of the three and most equal.

Doctoral students supervising a master student can easily find themselves in a multiple relationships situation with their supervisee. According to Scarborough *et al.* double relationships are the most common source for conflicts [4], but seem not to be considered unethical or problematic in all cases. It appears to the authors that multiple relationships should be seen as a means for professional development rather than as a restraint. Therefore they formulate guidelines that include information on possible issues, instructions about their position of power and give advice how to handle multiple relationships and boundary violations already at the beginning of their program. This approach is contradictory to the ethical model of the Oslo University [8], which explicitly states that double relationships have to be avoided.

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B. Expectations

Both expectations on the student and on the supervisor differ from the situation in ordinary courses. Thus, clearly stated expectations from both the student and the supervisor are important for efficient and fruitful supervision [6].

A good start for achieving an agreement about the expectations both bring into the supervision situation is to book a meeting and discuss them [7]. During this meeting, the supervisor may get a chance to identify the student's initial attitude towards the work as the student can be *excited, confused, overwhelmed or overconfident*. The supervisor would then have the chance to react appropriately to the student. The following issues should be discussed, and preferably be agreed upon [6]:

- Clarify research question, develop a conceptual framework, address gaps in the student's knowledge.
- Send a clear message that the master thesis project differs from the ordinary course in many ways
- State clearly that a master thesis project consists of two phases, (1) analyzing the given problem and (2) writing the thesis
- Discuss how the supervisor should coordinate and ensure that there is a good progress
- Ensuring that the relation between the supervisor and the student will be as formal as required to get the work done but not too formal.

Furthermore, Wisker et al. [7] outline also the following expectations on supervisors: (1) present the critique in a constructive way, (2) provide good knowledge of the research area; either personally, or by referring to an expert to access this knowledge, (3) make sure to ask open questions, (4) put the student in touch with information, and (5) encourage the students to enter the academic community by helping them attend appropriate conferences and introducing them to other researchers in their field. This last point reflects clearly that the focus of these guidelines is on the supervision of graduate projects and is in consequence not fully applicable to the undergraduate project supervisor. Finally, the student should not expect that the supervisor would do the work for him.

C. Possible practical issues

It is important to point out that problems may arise at different stages of the supervision process, even though the guidelines as pointed out above might be applied as far as possible. Two issues related to communication can be:

- Communication problems due to low language proficiency
- No writing skills to handle the elaboration of the final report

Wisker [6] points out that communication problems can create an uneasy relationship, since ideas, developments and suggestions can be misinterpreted. It is important that the student is able to articulate his ideas at the level at which he works and thinks, hence, external expertise for language support should be encouraged where necessary.

Writing problems must be identified early to be able to overcome them, potentially also here by considering external support with writing skills. Hence, the supervisor must encourage the student to write preferably in the very first weeks of the project work. The sooner the student begins to write the more he will be able to reflect, alter, develop, add and hone what actually has been done.

III. PRACTICAL INSIGHTS

We conducted a 45-minute interview with Gunnar Lindstedt at the department of Industrial Electrical Engineering and Automation of LTH. He can be considered an experienced supervisor, as ca 100 students completed their projects with him within the past 15 to 20 years.

According to our responder, the master's project offers the supervisor two important areas to influence the process. One is the "formality side", i.e., setting up a time plan, organizing communication with the student, controlling the communication style and guiding the student through the process as such. Regarding the roles of student and supervisor, there should always be a clear cut: The supervisor is the teacher and the student is the one to be taught. That said, it is still possible to keep up a rather informal communication style, i.e., our responder stated in accordance with the previously mentioned theoretical guidelines that the supervisor should be "as formal as necessary but not more".

The other perspective is that of the content. Here the supervisor should not provide answers but show ways out of seemingly difficult situations by sketching roughly the way towards the goal or milestone. To help a student over a project related crisis, i.e., a situation when experiments do not work out as expected or hoped, it is however crucial to gather as much insight as possible into what has been done, and what has happened, to be able to provide the student with a new goal or direction for the project, pointing out clearly to the student that such things happen and that even the new, potentially less ambitious goal is worth pursuing.

IV. DISCUSSION

While the literature we refer to has a strong focus on the supervision of *graduate* students, it was possible for us to get insight into successful supervision of *undergraduate* students from the practical perspective through the interview. As far as the formal part of the supervision process is concerned, both theory and (successful) practice suggest similar aspects to keep in mind. Student and supervisor should discuss their expectations and the goals of the work, conceptual framework and time line need to be pointed out clearly in the beginning of the process, and regular (short) meetings are suggested to keep momentum in the project and help the student engage with the work.

However, there are of course differences to be taken into account, mostly manifesting themselves in the differing time

perspectives for the respective projects and as a consequence in the roles and relationships that supervisor and student will have. As a master's project is expected to be conducted in a much shorter time frame than the doctoral thesis work, there is not as much time available to develop a relationship to reach a work process model corresponding to the "bush walking" or even "digging in the garden" metaphor.

We assume the model "creating in the kitchen" as most suitable, which gives the student a lot of autonomy, still being able to count on the support through the more senior companion whenever needed. This model summarises the formal aspects according to theoretical guidelines and practical insights most appropriately and opens up also for the handling of potential multiple relationships. Those have to be assumed as quite common between doctoral and master students due to the smaller distance in age and power. Even though it is mostly the supervisor who determines the type of roles, i.e., keeping the roles in the range of *teacher - pupil*, it is important to remember that both the student and the supervisor are parts in the "cooking game", meaning that each problem should be discussed for possible solutions. Still, an extremely important point is the risk of boundary violations. Both have to be aware of that and try to avoid them.

Right at the beginning clear boundaries have to be set and all expectations must be made clear. Evidently the assumed roles may change as well as the wishes of the two persons involved, but in any case these shifts have to be pointed out to avoid frustrations.

Another obviously important aspect when applying the theoretical guidelines for a doctoral thesis to an undergraduate project is the overall context of the project. While it can be assumed for the doctoral student that the project's purpose is the research as such, where it is important to be made aware of and be introduced into the respective research community, this is presumably not true for the undergraduate student. Additionally, as pointed out in the interview, the supervisor of a master's student must be prepared to take a close look into the metaphorical "soup" to provide the student with practical suggestions to solve a problem at hand rather than with abstract references to relevant literature and a guiding dialogue.

It is also important to note that during the course of a project several problems not related to the actual topic may arise, and need to be handled within the rather limited timeframe, i.e., as early as possible. Such issues can for instance consist of problems related to communication and writing skills. These should be pointed out and begin to be handled from very early stages of the work development so that they will not affect the results and quality of the final work.

Reflecting on the guidelines and suggestions we could accumulate, we realise that supervision is a challenging field by itself with lots of expectations on the supervisor from both the institution and the supervisees. It cannot be expected to

find the ultimate, standardised recipe for the perfect supervision, although we could point out several important issues to consider as a supervisor. We assume that someone simply being aware of challenges that may arise during the course of a project to be supervised, and suggestions for techniques to deal with them, is already more likely to be prepared to overcome them.

Finally, as is suggested by the mere number of successfully conducted projects our interview responder could refer to, it is a key point to practice, practice and practice, applying the mentioned guidelines and suggestions in real life until they become somewhat of a second nature.

V. CONCLUSION

With this report we presented our accumulated insight into the field of supervising master's projects, which we based on both literature studies and real life experiences. We conclude that to get through the master's project successfully, the most important precondition is a "learning contract" between supervisor and supervisee. The work to be done together by the supervisor and the student must have a clear scope and defined goals, where it is required to show clear engagement of both sides with the project. This can be supported by a continued dialog that will help to keep momentum and to be aware of the stages and evolution of the work done by the student. Finally, we conclude that the supervisor should mainly be supporting the student, giving him the most possible autonomy without letting him standing alone.

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