



Master Thesis School: improving student learning during thesis work, or: How to supervise a large number of thesis projects at the same time without succumbing to the workload

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How to supervise a large number of thesis
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*I can't define what a well written report is,
but I recognise one when I see it.*

Abstract

To be able to supervise a large number of thesis projects, and improve student learning during the thesis project, we have organised Master Thesis Schools (MTS) with four parts: start-up meeting, half-time presentations, writing workshop, and peer-review. In this paper, we discuss the organisation of the MTS and its effects on the students and the teachers.

Keywords: *Masters thesis, supervision, peer review.*

1 Introduction

The Master's Thesis project is the *grande finale* to the master's studies. At Chalmers, most project correspond to 20 weeks of full-time studies per student. Typically the students work in pairs, although projects undertaken by individual students are not uncommon.

A Master's Thesis project requires supervision and examination from at least one teacher. Being examiner and academic supervisor requires a fair amount of engagement and time. To ensure that the project does not veer off in the wrong direction, but stays on the straight and narrow academic path, regular contact with the students is required. This includes both contact via email, and supervision meetings with the students. It follows that supervision of multiple thesis projects in parallel can be quite laborious and require a lot of time. Additionally, within certain fields, there are relatively few active researchers in

relation to the number of thesis workers, leading to a high work load for these researchers.

It is therefore of interest to alleviate some of the burden, such that the efforts can be directed to where they are most needed, and (not without importance) to aspects of the supervision that the teacher enjoys more. For example, most thesis projects are comparable in its structure and need similar information throughout the project, i.e., what is needed for the planning report and how to structure a good thesis report. It is, thus, much more efficient to mediate this information to many students at once. Furthermore, students can learn from reading other students reports and, with some instructions, also provide good peer-feedback regarding structure, language, level of detail, etc. By allowing the students to read each others reports, the workload is reduced for the teacher while the students learn and evolve.

To this end, we started a *Master Thesis School* (MTS) in spring 2016, and have held it annually since then. This has allowed us (three teachers) to supervise around 45 to 50 thesis projects during the years 2016 to 2018 on just three teachers.

In this presentation, we describe the organisation of the MTS, and share our reflections and experiences of supervising master theses this way. The presentation is targeted to any teacher who supervises theses, and is organised as follows. Chalmers' Master's thesis guidelines are overviewed in Section 2. The organisation of the MTS is presented in Section 3, and the employed communication strategy is presented in Section 4. In Section 5 we discuss how the MTS relates to Chalmers' thesis objectives, and how it relates to published literature about supervision. The paper is concluded in Section 6.

2 Chalmers' Guidelines for Master's Theses

The regulations governing Master's Theses at Chalmers are described in the "*Instructions for theses on the Master of Science in Engineering, Architecture and Master of Science Programmes*", see [1]. The aim of the thesis is for the student to develop a deepened knowledge and understanding of the knowledge that was acquired previously during the Master's Programme, and to demonstrate capability for autonomous work as a Master of Science [1, Sec. 4]. Eleven objectives are identified in the regulations [1, Sec. 4], including the following:

- Contribute to research and development work, and be able to relate his or her work to the relevant scientific and technical/industrially/architectonic contexts,
- With a holistic approach, to identify, formulate and deal with complex issues critically, autonomously and creatively,
- To plan and perform highly qualified tasks using adequate methods within given parameters, and to be capable of critically evaluating this work,

- Present clearly and discuss his or her solutions in English, as well as the knowledge and the arguments on which these are based,

To each thesis, an examiner is assigned [1, Sec. 5]; the examiner “*bears the scientific and quality- related responsibility for the thesis, as well as for compliance with the learning objectives*”.

An important purpose of the MTS is to provide a support structure to the examiners, such that they can meet their responsibility and provide the necessary support to the students in fulfilling all the objectives. After presenting the organisation and the communication strategy of the MTS, we return to the guidelines to assess how the MTS helps the students meet the objectives of the Master’s Thesis.

3 Organisation of MTS

Our MTS has four main parts: a start-up meeting; half-time presentations; a workshop about writing and peer-review; and an optional review of another group’s thesis report.

3.1 Start-up meeting

When supervising many master thesis projects, the beginning of the semester tends to be filled with informal start-up meetings where the supervisor repeats the same information over and over again. That is, giving general information regarding the time-line and steps needed in a typical thesis project.

To make this more efficient, in the MTS we have a single start-up meeting attended by all students that we supervise, where we disseminate the necessary information to all students at once. In this way, we know that all students have received the same information and, as the material is developed jointly and based on the experience of three supervisors, we can confidently stress things that we find to be important. An example of this is, the importance of making a careful plan in the beginning of the project and the necessity to reassess and update the plan in accordance to the progress of the project.

Another thing that is highlighted is the importance of communicating planning and project progress to the examiner/supervisor. The students are encouraged to write weekly progress reports to their examiner/supervisor.

Besides giving practical information in an efficient and structured manner, the purpose of the start-up meeting is also to let the students in the MTS meet and, at an early stage, get inspired by what the others are planning to do. For this, we let each group shortly present their problem and how they aim at solving it.

3.2 Half-time presentations

About ten weeks after the start-up meeting we hold half-time presentations. The projects are divided into groups of three to four projects, who present for

each other and at least one teacher. Each project is given 30 minutes, roughly 20 minutes presentation and 10 minutes discussion with feedback from their peers and from the teacher.

The students are instructed to present their problem, what they have done so far, their plan for the remainder of the project, what they hope to achieve, and potential difficulties they might face going forward. The received feedback is on all points, although the main focus is to produce a solid plan for rest of the project. Student engagement in the discussion has varied: some students are eager to discuss the work of their peers, other students are more quiet. In general, our experience of peer-feedback very positive, although many students lack theoretical knowledge to be able to give detailed feedback, they can still provide insights regarding, e.g., the proposed plan and practical aspects.

By listening to their presentations, the teachers are given a deeper understanding of the progress, and any problems can be dealt with immediately. The half-time presentations are also an important check-point for the students, where they need to have achieved a fair amount of work. This lowers the risk that they procrastinate during the first few weeks in the belief that things can be solved towards the end.

3.3 Writing and peer-review workshop

The Writing and Peer-Review (WPR) workshop is organised about two thirds into the project duration. Before the workshop, the students are asked to watch three online lectures about peer-review, and to have a look at three example reports.

To start the workshop, the students are given some advice on how to approach the writing, such as to focus on bigger details first, and then progressively on smaller things. The teachers enforce that the writing is not a linear process, rather it is iterative, or circular, in nature. The students are also pointed to some writing resources, see, [2, 3].

The workshop has been given help by Anthony Norman and additional staff from the Language and Communication department at Chalmers. It has three main parts: Example Reports; Construction of Paragraphs; and Introduction to Peer-Review.

3.3.1 Example reports

The three example reports, see [4, 5, 6], were selected by the teachers as examples of reports that have high quality but with different writing style. At the workshop, the students are asked to form groups of three to four students, and students who work in pairs are encourage to split in order to be exposed to more new ideas. With the example reports in mind, they are asked to consider the following questions:

- How are the reports structured?
- What do you like about them?

- What do you think could be improved?

This part of the workshop is concluded with a group discussion, which is summarised into a list of important points that are distributed to the students. The list pertains not only to the actual written text, but also to the writing process, which often is a daunting task for the students.

3.3.2 Construction of paragraphs

After discussing the example reports, the focus is shifted to writing paragraphs. In the same groups the students are asked to discuss a few example paragraphs, and to answer the following questions:

1. What do you like/dislike about the paragraphs?
2. How are the “good” paragraphs structured? Try to describe the start, middle and end in generic terms.

Again, the exercise is finished with a group discussion, and the important points are added to the list mentioned above.

3.3.3 Introduction to peer-review

The final part of the WPR workshop is a brief introduction and motivation to peer-review, and instructions on how it can be performed. The focus is on providing basic tools such that the students can give good constructive criticism to their peers’ reports.

3.4 Peer-review

Participation in peer-reviewing has been on a voluntary basis; during the years 2016–2018 a majority of the students have opted to participate. We believe that the peer-review has been important for increasing the quality of the first version of the thesis that is sent to the supervisor. We believe that the following has contributed to this: the students have been given one or two rounds of feedback from some of their peers; by reviewing another reports they get insights into what they need to improve in their own report [7]; the peer-review enforces the importance of high quality writing [8].

4 Communication strategy

Both one-way communication from the teachers to the students, and two-way communication between the students and teachers, are important. To avoid *death by email*, we distribute the following important information to all students in the MTS at the same time, rather than individually to each project:

1. Information about starting a project, e.g., registration and project proposals.

2. Information required on the first page of the thesis, e.g., how to obtain a thesis number from the administration.
3. Information required for announcing the thesis presentation.

This means that much less time is spent distributing standard information to the students, which makes time available for other tasks, such as supervision meetings with the students.

The weekly emails that the students are asked to send give the supervisor an immediate idea of how the project is progressing. Typically only a short response is sent; when more feedback is necessary, the students are asked to come to Chalmers for a supervision meeting. Our experience is that the weekly emails are helpful to make sure that the projects are on the right track. This is especially important when the students are receiving most of their supervision from the collaborating companies, and the Chalmers supervisor is not able to have as regular meetings with them.

5 Discussion

In this section, we first discuss how the MTS supports the students and teachers in achieving the thesis objectives. Then, we discuss the MTS in relation to published literature about thesis supervision.

5.1 Support for meeting thesis objectives

Relating to the Master's Thesis Guidelines, see Section 2, the start-up meeting is central to, at an early stage, making the students motivated and inspired to work hard on their projects. It enforces their responsibility to work autonomously, to plan their work, and to think about how they will contribute to research and development work.

During the half-time presentations, the teachers are given an overview of the progress thus far, and what the plan for the future is. This is important for the students' objectives to plan the work, and to make contributions to research and development.

The writing and peer-review workshop, and the subsequent peer-reviewing, are instrumental in helping the students meet the objective to clearly present their work in English.

5.2 Relation to previous work

Thesis supervision is a challenging task, both at the Master's level and the PhD level [9], and many have studied how the supervision can be improved, in order to improve the experience for both the student and the teacher.

De Kleijn et al [10] identified two important aspects of supervision: control and affiliation. They write that "*the control dimension describes the extent to which a particular teacher or supervisor influences the student activities; the*

affiliation dimension describes the emotional distance or interpersonal proximity between a supervisor and a student.” Both aspects are important for the success of the thesis projects; affiliation is more important, and control should be balanced [10]. The MTS allow the teacher to directly influence the student activities, i.e., exert control. We also believe that showing enthusiasm for their projects, and that we care about their progress, is positive for the affiliation.

Dysthe et al [11] used three kinds of supervision: several students meeting without a teacher; several students and one supervisor; and one-on-one student supervisor meetings. When students meet without teachers, they tended to discuss other aspects of their projects than what they did if a teacher was present, or if they were meeting one-on-one. The different kinds of supervision proved to be complementary. An improved success rate was observed, and fewer students dropped out [11]. The MTS has contained all three kinds of meetings:

- During peer-review, the students discuss each others work without teacher involvement.
- The start-up meeting, half-time presentations, and the Writing and Peer-Review workshop, are all meetings where several students discuss with the teachers.
- The weekly emails that the students are asked to write are a form of one-on-one supervision. Additionally, all students also meet with their supervisor regularly throughout the project.

Several different projects have looked into using Information and Communication Technology (ICT) platforms to aid the supervision process, e.g., [12, 13, 14]. While the MTS does not involve any use of ICT, its purpose is similar: to provide a structure/framework that aid the supervision, and alleviate some of the teachers workload, such that time and effort can be directed to where it better helps the student.

Reynolds et al [15] organized a course about writing/peer-review, and also worked one-on-one with the students. This improved student writing, and also helped the teachers to organize their work with the students more effectively and efficiently. Students enrolled in this programme had a higher chance of receiving high honours, compared to student who did not enroll. Students at Chalmers are only given a pass/fail grade, however, the findings of the MTS are in keeping with the results by Reynolds et al; especially writing has improved.

6 Concluding remarks

A formal evaluation of the MTS has not been performed with the students. Some students have spontaneously offered their feedback, which overall have been positive. Some students appear to become inspired to do a good project after hearing about the work of others. As an example of a direct effect of the MTS, two students updated their thesis structure in its entirety after having first

peer-reviewed a report and found weaknesses in its structure, and then coming to the realisation that their own report had similar weaknesses.

From the teachers' perspective, the MTS has had several benefits:

1. The teachers that participate in the MTS have discussed how to supervise projects to a much larger degree than before. We believe that this improves the supervision overall, and lowers the risk that a group receives poor supervision.
2. The writing workshop, and the peer-reviewing, has both been instrumental in making the students understand that the written thesis report is equally important to the work that has been performed. The final quality of the writing is on par to what we experience before organising the MTS; however, the quality of the first draft that is sent to the supervisor has increased immensely. Often, a single iteration of feedback is sufficient, compared to two or three iterations which was often necessary before the MTS.
3. Generally speaking, the students who communicate well about their progress also do better in the end. The students who do not communicate well, often do so because progress has been slow. Due to the expectation of a weekly email, we can catch problematic projects earlier, and try to support the students as necessary.
4. Decreased workload. There is much less communication needed, much fewer emails sent and received. By distributing important information at once to everyone, it saves us a lot of time from having to contact each and every group. Thanks to the increased report quality, less time has to be dedicated to reading theses and giving feedback. This is especially important, because many students finish their projects around the same time which can create a significant workload.

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