How to improve master students experience and learning outcome during their master's thesis?

Y. Stenstrøm*[1,2], L. Jensen[3], L. Godager[4] and S. Antonsen[2]

[1]Dep. Chemistry, Biotechnology and Food Science, Norwegian University of Life Sciences
*Corresponding author: yngve.stenstrom@nmbu.no
[2]Department of Mechanical, Electronics and Chemical Engineering, Oslomet - Oslo Metropolitan University
[3]Drammen sykehus, Vestre Viken Helseforetak.
[4]Dep. of Educational Science, Faculty of Science and Technology, Norwegian University of Life Sciences

ABSTRACT:

Most studies on the follow-up and supervision of students, are focused on Ph.D. level, despite that most students complete their education with bachelor's or master's degrees. In a previous study on students working with their master's thesis in organic chemistry, our surveys revealed that many students are unsure of their own role and responsibilities. This insecurity leads to decreased motivation and efficacy.

We have previously described our work on understanding the situation for master students [1]. We also suggested some measures to improve the situation. One of these was clarification of expectations. We documented that a clear understanding of what is expected from them, what they can expect from the supervisor, and an understanding on how they will be assessed during the master's thesis, led to a targeted approach. The students worked more effectively on the different aspects of the project regarding theory, laboratory work, writing, data analysis etc., and thus had a better experience. The improvement was measured by questionnaires and interviews.

In this presentation, we will look more at measures used, and results from qualitative study interviews done during the process. These interviews aimed to learn about students' experience of the whole process, in particular, what affected the motivation and how supervision affected how they approached learning outcomes.

These interviews also revealed that the students felt more confident with the assessment of the thesis after the measures were introduced. Even though the distribution of grades were not changed, students were more pleased with the given grade and the experience of doing a master's degree, compared to control group. In addition, we will focus on how the learning management system Canvas was used in combination with other digital resources and how the traditional group meetings were transformed into a learning forum. Students' feedback and experiences are reported.

1 INTRODUCTION:

We have recently published a paper on supervision on master students (Antonsen et al., 2022). We found that many students are unsure about their own role in the work on the master's thesis. The students also exposed low self-esteem and self-efficacy when working independent. It also seemed that most students chose to focus on the laboratory work, and postponing reading literature and writing on the thesis. This seems to be common for study programs with practical experimental work.

Wolff explains it by the fact that many perceive the writing as a result of the research rather than part of the process (Wolff, 2010). This is problematic as Beistel (1975), Herron (1978) and Johnstone (2006) have all shown that theoretical background is necessary to understand experiments. Some of our students

also confirmed that they realized too late that they might have made mistakes and misinterpretations in early laboratory experiments.

We interviewed master students from our research group, and from other research groups at NMBU and University of Oslo (all from chemistry and biotechnology sections). The results were that most of these students were unsure of what was expected from them, and that they felt stress due to this. Several also mentioned that they were very motivated prior to starting the work on the master's thesis. Sadly, they felt that they lost some of the motivation as they found the frames confusing compared to previous university courses. In particular, the students were confused about the evaluation and how they should prioritize time (Antonsen et al., 2022). Some also said that they felt that the time spent on understanding the framework was at the expense of the work on the master's thesis.

Even though little work is published on supervision of master students, some very relevant studies have been published (Anderson et al., 2008; Dysthe et al., 2006; Filippou et al., 2017; Firing et al., 2013). However, the main portion of studies of supervision, is on Ph.D. candidates, and we have also learned a lot from these. We chose to focus on the effects of self-efficacy (Bandura, 1997) and inner motivation (Ryan & Deci, 2017), as these are topics we have been interested in for a long time. Some major points useful as background for our study is summarized below:

1. The relationship between the supervisor and the student is essential for success in a research process (Dysthe et al., 2006). The supervision is especially important when it comes to writing the thesis: Students who experience the supervisor as an evaluator rather than a dialogue partner take few risks when it comes to writing (Dysthe, 2002; Dysthe, 2003).

2. Overall (2011) showed that high self-efficacy promotes further development of skills, which in turn produces better results, while Bishop and Bieschke (1998) showed that high self-efficacy has a direct effect on the student's interest in research and an indirect effect on their expectations of results.

3. Self-efficacy and self-esteem are influenced by, among other things, the guidance the student receives (Overall et al., 2011) In turn, it has been shown to affect the quality of the written product (Prat-Sala & Redford, 2012).

4. Self-efficacy is of great importance to keep motivation up when facing opposition and problems (Graham, 2007).

In this study, we investigated how measures affected the students' stress level during the work, confident during examination and how it made them reflect on their own work during the last part of the master's thesis.

2 MEASURES

Van Rensburg (2016) have pointed out the importance of the supervisor's contribution to the students being aware of, and making use of, the supporting framework that the university offers.

A course room was created for the master's students in the digital learning platform, Canvas, where useful information was posted.

All students were invited to discuss the first supervisor-student meeting, which is held in the semester before they begin work on the master's thesis. In this meeting we discussed what is expected from the student in the European Qualifications Framework – EQF (Kunnskapsdepartementet., 2011), and how we will reach that goal. In other words, we tried to make it very clear that also the master project is part of teaching. We also emphasized on the importance of independence, which is again listed in the EQF as a key qualification. It was also made clear that the writing and the theory is just as important as the practical laboratory work, and that the students must focus on all of these from the start.

To make students work throughout the semesters, we changed part of the group meetings – where research progress was reported – to more learning focused seminars. Here, students presented theoretical topics that was relevant for the project. The main thought here was to make students getting started with the literature searching. Students were encouraged to use the presentation and feedback to write on the theory of their thesis.

The student group was split in two groups, one group was exposed to the measures and one group was supervised as before (reference group). Details on the method can be read in our previous work (Antonsen et al., 2022).

3 RESULTS AND DISCUSSION

The results presented herein are from the data obtained in the same interviews used in our previous work (Antonsen et al., 2022). However, the data described here was not discussed before.

These students also experienced that it was easier to interpret the research data after the aim and theory were clear, and thus easier to discuss with each other and with the supervisors. The students who presented theory in the seminars also reported that their belief in their own skills remained steady throughout the work period.

They also reported to work more targeted towards the final product with a better balance between thesis and laboratory work. Due to this, students seemed to have a better overview on the topics they were working with. We, the supervisors, experienced that the students took more control of their projects, and more often came with their own ideas and suggestions on how to solve problems.

Students reported in interviews that the measures helped them a lot, and in the questionnaire, they scored lower on stress level during the last weeks before submitting the thesis. This is no surprise, as many said in interviews that they save the writing for last, and then realize that it is more work, and harder than they assumed it would be (Antonsen et al., 2022).

Not surprising - but still interesting – these students also reported to enjoy the writing part of the project more, but still spent more time with laboratory work. They reported to work more hours in the laboratory per week, compared to the students that did not get these measures. It should be mentioned that supervisors did not encourage or force these students to work more: they simply wanted to, as they found the research more engaging. These students gave higher score on all questions regarding self-efficacy and motivation compared to the students who did not take part of this research project.

Of this, one student said: "*Honestly, the writing part was also fun. Well, at least reading literature and seeing the thesis take form. I felt that I learned something almost every day. I really enjoyed it!"*

Regarding the examination, the grades did not change significantly, but the students felt less stress before and during the oral presentation. Students also reported to have reflected more on their work due to better understanding of the expectations and evaluation criteria. This led to the students being more pleased with the given grade than the reference group. In another questionnaire, the students from the reference group demonstrated poorer ability to correctly place themselves on the grading scale (A-F) compared to the other students.

One student said that "*working with my thesis was different from what I expected. I am glad you went through the expectations and frame[work]. Some friends claimed that the independence what confusing, but I felt I had a good understanding. All in all, I'm pleased, but realize that research is not for me."*

Another student said that "*I feel that I had a very good understanding of what was good and what was not good with my work. I felt some stress as I started my oral presentation, since this was the first time I met the examiner, but I pretty much knew my grade before I got it, and it proved to be correct. It turned out to be a good conversation, rather than the stressful experience I was expecting.*

4 CONCLUSION:

The results reveal that the introduced measures worked well in increasing the students understanding and reflection of their work. Students who followed the measures reported to feel less stress about the examination and evaluation of their work and was more aware of the quality of their work.

All in all, the students seem to feel less stress, and thus enjoy the master's thesis more compared after the listed measures were introduced.

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