

HIGHER EDUCATION THESIS SUPERVISION - A NEW, HYBRID SUPERVISORY MODEL

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ABSTRACT

One of the final courses, if not the last course at university level in Sweden, and especially within the engineering programs, is a thesis course where the students demonstrate their accumulated knowledge and skills. One, or sometimes two students, identifies a topic of interest within his/her main field of study and is guided through the process by a supervisor. Preferably the supervisor has a lot of experience, both within the main field of study and as a thesis supervisor. Many times, however, the latter is not always the case. Hence, some form of recording of the supervisory process would be of importance, to be able to assess the supervisory competence of the supervisor. Through this recording, potential weak supervisory spots can be identified, and a special focus could be put on these.

In literature several supervisory models have been proposed over the years. The goal of this paper is to demonstrate, through a case study, how three of these models can be successfully combined to a hybrid model around the supervisory process building on grounded theory. A combination of the three models together identifies the individual supervisory process of a thesis supervisor. An analysis is then performed, and weak spots in the supervisory process of a novice supervisor can thus be identified and addressed. The results presented in this paper are based on a case where an experienced thesis supervisor was observed during a supervisory session. Hence, the case forms a baseline of what a “good” supervisory session looks like. By applying the hybrid supervisory model on a novice thesis supervisor, possible weaknesses in the process can be identified.

As both students and teachers are involved in a one-to-one teaching-learning activity during the thesis process, CDIO standards such as number 8 (active learning) is important from the students' point-of-view, but especially standard number 10 (enhancement of faculty teaching competence) is of high importance as the competence of the novice supervisor, or the lack thereof, becomes evident and can be appropriately addressed through especially designed activities.

KEYWORDS

Student attitude change, Supervisory dialogue, Supervisory model, Supervisory management styles, Thesis supervision, Standards: 8, 10

INTRODUCTION

The student learning process at higher education is gradual and commences with students acquiring basic knowledge, competences, and skills within their specific main field of study through single, but interrelated, courses. Theoretical knowledge in the form of lectures is combined with practical skills in the form of, for example, laboratories, problem-based learning, or capstone projects. At the end of their studies, Swedish university students are faced with a professional thesis work where they need to demonstrate their acquired and accumulated abilities, ending with an oral presentation and a written report. The thesis work per se is usually realized by one or two students embarking a specific topic within their main field of study during the last semester where they, together with a supervisor, step-by-step and through multiple meetings reach a final goal that should comply with some predefined qualitative and quantitative criteria. The process towards the final goal is iterative and is highly influenced by the competence of the thesis supervisor. The thesis work is also the last opportunity for the students to acquire new knowledge, competences, and skills, on top of what they have already learned.

One of the main goals of a thesis on undergraduate, graduate, or postgraduate level, is for the student to acquire a set of skills in the trade of realizing a scientific work and present the results, both orally and in writing. These skills can be *discipline-specific*, for example, learning about graph theory or English 1900-century poets, or *generic*, for example, learning about scientific writing or time management (Mejtoft and Vesterberg, 2017) Related to these specific and generic skills are so called *conceptual threshold levels* that need to be crossed (Kiley and Wisker, 2009; Meyer and Land, 2003; Wisker and Kiley, 2018). After having crossed a conceptual threshold, a student is able to approach his/her specific theme with a new set of eyes. The characteristic stages and dimensions of conceptual threshold crossing accordingly to Wisker (2012) are:

- Liminality (stuck places and movements through)
- Praxis (integration of concepts and action, change)
- Dialogue (discourse of subject and research, dialogue between ideas and practice, people)
- Ontology (identity/identities, being in the world)
- Epistemology (knowledge-contribution to meaning)

The five stages, except for one, are solely in the hands of the student, meaning that the student needs to be in control of his/her own learning and be able to pass the thresholds on his/her own behalf. The exception being “dialogue”, where the supervisor has a one-to-one relation with the student. This is the main reason why supervisory meetings are of such importance to the student’s learning process during the progress of the thesis work. If correctly handled, the other four conceptual threshold crossing stages can be observed by the supervisor and adequately addressed during the recurring supervisory meetings.

The supervisor-supervisee process is complex and has been investigated and described by many researchers using so called supervisory models. This paper presents a composite supervisory model based on three supervisory models, that is, *supervisory management styles* (Gatfield and Alpert, 2002), *supervisory dialogues* (Wisker, 2012), and *student attitude change* (Aronson et al., 2010). Its usefulness is evaluated through the analysis of a realized supervisor-supervisee meeting during which both the experienced supervisor and the supervisees demonstrate a behavior that is well captured in the hybrid supervisory model. Applying the

model during the evaluation of novice supervisors, their strengths and shortcomings as a supervisor become evident which means that especially adapted supervisory training activities can be developed and applied to increase the expertise of the novice supervisors.

The rest of this paper is divided in five sections. First, the research methodology applied in this paper is outlined. The second section describes the practical arrangements of the case of the analyzed supervisory meeting. Next, the theoretical background that the work is based on is presented. The three supervisory models that together constitute the composite supervisory model are presented. The fourth section examines the analysis of the composite supervisory model when applied to the supervisory case and the results from this analysis. The fifth and final section presents some conclusions of the work and argues why the hybrid supervisory model should be used by novice thesis supervisors to identify their shortcomings, or strengths, as supervisors.

METHODOLOGY

The research method applied in the work presented in this paper consists of a modified form of grounded theory (Glaser, 1992). In this paper it implies that a new theory is developed as a combination of previously developed theories and an analysis of the compiled data (that is, the sentences from the recording collected during the observation of the supervisory meeting and the coding of these). The presented grounded theory is inherently abductive (Reichertz, 2007) meaning that the observation data was first transcribed and coded (the inductive part) followed by a comparison with previously developed theories, the fitting of the transcribed texts within the theories (so called core categories) and the development of a new theory (the deductive part). The grounded theory process applied during the work presented in this paper consisted mainly of the following steps: (1) theory collection → (2) hypothesis formulation → (3) data collection → (4) data analysis → (5) theory building → (6) theory validation.

ANALYZED CASE

The results presented in this paper are based on the observations of a supervisory meeting on undergraduate level that lasted 30 minutes. Two computer engineering students realized a thesis work during a semester and the specific meeting took place relatively early in the supervisory process. The purpose of this paper is to demonstrate how changes in the supervisory style of an experienced thesis supervisor were captured by a composite supervisory model and how such recorded changes can be used by novice thesis supervisors to detect possible weaknesses in their supervisory process.

In continuation are presented the initial discussions with the supervisor before the supervisory meeting (pre-supervision), the observations during the supervisory meeting between the supervisor and the supervisees (observation) and the brief summing up after the supervisory meeting (post-supervision).

Pre-supervision

Before the supervisory meeting, the background of the supervisor was investigated. The supervisor was an associate professor at the Computer Science and Informatics department at Jönköping University who since 1999 had supervised some 50 theses at bachelor and master level. The supervisor considered himself to be more of the supportive type of supervisor, trying not to influence on the students' work too much. Based on the conceptual model by

Gasfield and Alpert (2002) (see Figure 1), the supervisor categorized his supervision style as being *contractual*, which implies the following:

- high structure and high support
- student highly motivated and able to take direction and to act on own initiative
- supervisor able to administer direction and exercises good management skills and interpersonal relationships
- most demanding in terms of supervisor time

Whenever possible, the supervisor sought to act both as a buddy and as a mentor, but it depended on how structured and dedicated he found the students to be towards the thesis work. Before meeting with a student for the first time, the supervisor prepared himself by trying to straighten out the problem picture of the thesis and to foresee the student's expectations on the meeting. When having to choose between the product of the thesis, that is, the quality of the written thesis report, or the process, that is, the student learning how to produce a quality report, the supervisor considered the process to be the most important, even though most students put their main interest in the observable part of the thesis, that is, the final report. Summing up, the five most important competences of a good supervisor, accordingly to the supervisor that participated in this work, are:

- scientifically knowledgeable (Hallberg et al., 2012)
- experience from similar development/research work (Love and Street, 1998; Philips and Pugh, 1994; Wisker, 2012)
- skilled at writing reports (Hallberg et al., 2012; Tynjälä, 2001)
- provides constructive critics (Philips and Pugh, 1994; Wisker, 2012)
- sees the bigger picture within a thesis (Adams et al., 2015)

Observation

The specific observation consisted of two students at bachelor level. According to the supervisor, the students were lagging in their thesis work. The meeting took place in a special meeting room and lasted 30 minutes. Both students talked during the session but one more than the other, where the less talkative student took notes on his computer. At the very start, the students put forward that they wanted to switch two sections in the report, but the supervisor explained that this would make the report lose in coherence. The learning process was also stressed in the initial stage of the meeting where the supervisor explained that the students had so far made a journey where they had learned about how and when to apply the methods they had previously chosen. After this "high-level" questions the discussion changed focus on more detailed aspects, but the supervisor never let the students lose the big picture of their work or get lost in intricate details.

Post-supervision

According to the supervisor, the students seemed to assimilate most of the comments made during the meeting. Nonetheless, the experience of the supervisor was that students often do not achieve this. Hence, he applied a method known as SWOT where he estimates the risk (of failure) at a given stage or situation during the thesis process by evaluating the Strengths (S), Weaknesses (W), Opportunities (O) and Threats (T) of the thesis work. He then takes preparatory actions based on the result from the risk estimation. This seems a reasonable

method that through the reactive analysis of a supervisory meeting proactively prepares for the next meeting.

THEORETICAL BACKGROUND

The following section presents the theoretical background of three different supervisory models that have been applied during the supervisory meeting, namely *supervisory management styles*, *supervisory dialogues*, and *student attitude change*.

Supervisory management styles

The analysis that is undertaken in continuation is based on the supervisory management styles model by Gatfield and Alpert (2002) (also touched upon by Wisker, 2012). To create the model, the authors conducted a literature review including some 60 significant scholarly items related to Ph.D. supervision. The review made it possible to establish an array of variables that were deemed significant to the supervisory process at doctoral level. The authors identified some 80 elements that were deemed significant, which were further clustered into eight groups. Each of the eight groups were factored according to whether they were classified as *structural*, *support* or *exogenous*.

The *structural* factor was defined as those elements supplied principally by the supervisor in negotiation with the student. They are generally directive aspects and incorporate the variable groups of the organizational process, the accountability stages and skills provision. The elements of this factor assist in the management process of the thesis. (Structural examples: setting stages and goals, negotiated meetings or time management).

The *support* factor was defined as those elements supplied by the institution and supervisor that are non-directive, optional and discretionary. These include variables that can be grouped into areas such as pastoral care, material requirements, financial needs, and technical support. (Support examples: mentoring or positive feedback).

The *exogenous* factor does not contain neither structural nor support variables as the variables are relatively fixed. (Exogenous examples: organizational skills, interpersonal skills). The third factor was thus not incorporated into the model defined by Gatfield and Alpert. The result is illustrated in Figure 1. To make it easier to follow the transitions between the different supervisory management styles and how they are related to the observations made during the supervision meeting described further on, the different quadrants and the corresponding texts in the coming tables are marked using different shades.

The graphical representation of the supervisory management styles model consists of four quadrants, each representing a specific supervisory style. The supervisory styles and some related characteristics are outlined in Table 1. The contractual quadrant seems to be where most supervisors like to place themselves, according to results by Gatfield and Alpert (2002). Out of 12 interviewed supervisors, 9 were considered contractual while one was pastoral, one laissez-faire and one directorial. Gatfield noticed that the adoption of a preferred supervisory style was not defined solely by the supervisor's personal style or goals but was also influenced by the student's attitudes, the type and level of the thesis work, where in the process the thesis work currently was situated, etc. (Gatfield, 2005).

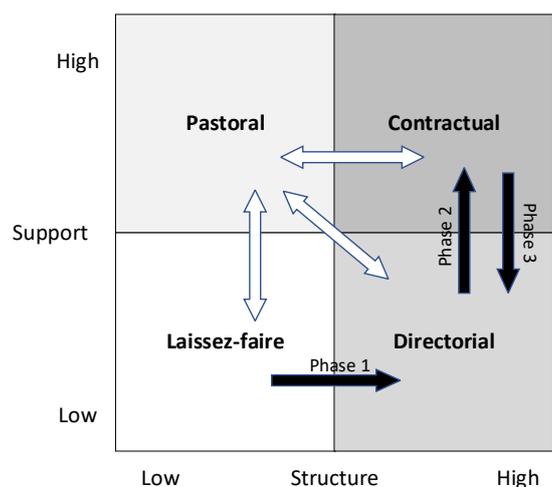


Figure 1. Supervisory management styles model and changes over time, Gatfield and Alpert (2002)

In their study, Gatfield and Alpert (2002) also noticed that the supervisory style changed over time (Figure 1, where the black arrows indicate different phases in a supervisory meeting while the white arrows indicate situations when a potential need for the supervisor to temporarily engage in the pastoral supervisory style is required which may occur at times of crisis, discouragement, or frustration on the part of the student). At the beginning of a supervision session, students generally have a limited focus and often search very broadly for a gap in the literature to discover a thesis topic. This usually involves very little structure and limited support, hence the term laissez-faire style. As the students advance, the thesis subject, research domain, and research questions usually evolve. In that situation the supervisor generally moves into offering more structure to aid in formally assisting the creation of the research design and aiding the methodological development.

Table 1. Characteristics of supervisory management styles, Gatfield and Alpert (2002)

Style	Structure	Observations
Laissez-faire	Low structure Low support	Supervisee has limited levels of motivation and management skills
		Supervisor is non-directive and not committed to high levels of personal interaction
		Supervisor may appear uncaring and uninvolved
Pastoral	Low structure High support	Supervisee has personal low management skills but takes advantage of all the support facilities that are on offer
		Supervisor provides considerable personal care and support but not necessarily in a task-driven directive capacity
Directorial	High structure Low support	Supervisee highly motivated and sees the necessity to take advantage of engaging in high structural activities such as setting objectives, completing, and submitting work on time on own initiative without taking advantage of institutional support
		Supervisor has a close and regular interactive relationship with the candidate, but avoids non-task issues
Contractual	High structure High support	Supervisee highly motivated and able to take direction and to act on own initiative
		Supervisor able to administer direction and exercises, good management skills and interpersonal relationships

Hence, the directorial supervision style becomes predominant. Next, the movement is towards the contractual quadrant. In this situation, most likely, the students will be engaged in data collection and analysis. In this phase, 'high' levels of support and 'high' levels of structure are most likely to be required from the supervisor. However, as the students move into the writing stage, that situation is not likely to continue. The students will possibly have reduced needs of support and yet still have high needs of structure. Hence, the supervisory style will occasionally move back to the directorial position.

Supervisory dialogues

In the book, the Good Supervisor (Wisker, 2012), chapter 8 (Supervisory dialogues), Wisker presents a set of supervisory questioning themes, or dialogues, divided into 11 intervention categories (from the supervisor's point-of-view). These are outlined in Table 2. The dialogues in the table constitute examples of situations when a supervisor interacts with a student. When, where, and how to use the different category dialogues depends on the supervisor, the type of student, when and where in the thesis process the dialogue takes place, and so forth. Thus, it is up to the supervisor to decide when to apply a specific category. An unexperienced supervisor possibly needs to be consciously aware of the need to change between the categories while an experienced supervisor, on the other hand, does this intuitively.

Table 2. Characteristics of supervisory dialogues, slightly modified from Wisker (2012)

Category	Supervisor	Dialogues
Tension-relieving	Relaxes	<ul style="list-style-type: none"> • Oh no! Not more of those bar charts! • How are you fitting all these interviews into your busy holiday schedule? • Is your daughter well?
Informative	Provides (straightforward information)	<ul style="list-style-type: none"> • It needs to be referenced - using the Harvard system. • Ramsden and Entwistle would be good researchers to follow up here.
Didactic	Teaches	<ul style="list-style-type: none"> • The abstract should be only 500 words and you must ensure it is concise clear, accessible to your examiners. • Look at these models and try to produce a draft version following one of them.
Prescriptive	Prescribes (a solution)	<ul style="list-style-type: none"> • No, don't cut the results part away from the discussion and interpretation. They need to be woven together.
Confronting Challenging	Provokes	<ul style="list-style-type: none"> • Really, how do you think you are going to access this sample • You have not yet made a realistic suggestion - there could be problems - how will you tackle them • The statistics so far just don't answer your question. You need to re-design the research for the next phase. • The results seem to suggest a contradiction to your hypothesis - what does that suggest for your theories and next steps.
Eliciting	Draws forth	<ul style="list-style-type: none"> • If you wanted to observe the children, how might you do this without affecting their behavior? • Could you just explore what these different interview categories suggest in terms of your argument about disclosure? What could happen next?

Category	Supervisor	Dialogues
Supporting	Encourages	<ul style="list-style-type: none"> • This is an impressive participation rate. • The work is going well, you have responded critically and evaluatively to the results of your interviews and fed these into changes in your proposal. Good.
Encouraging Facilitating	Drives	<ul style="list-style-type: none"> • I see you have written about how Virginia Woolf engages with inner thoughts. Is this just a formal experiment in your view, or is she saying something about self, experience, and the ways we perceive and express it? • You have shown how widening participation agendas appear in government documents and in university mission statements. Do you perceive any contradictions, paradoxes or problems with the equally popular comments about fee payments?
Summarizing	Condensates	<ul style="list-style-type: none"> • It seems you have found a range of themes here and have analyzed and discussed them according to the categories you have developed. • So, as you argue, Lacan's mirror phase is challenged from a feminist perspective by Kristeva's essays as quoted in your second chapter ...
Clarifying	Arguments	<ul style="list-style-type: none"> • Are you arguing, from your results in the two classrooms you observed, that it seems girls are more likely to tidy up than boys'? If so, you probably need to ... • I'm not sure what you are saying here about the effectiveness of that procedure on re-growing coral - could you revisit the data and then explicitly link it to your argument? • What do you mean here by the term postcolonialism? Is it (a) in opposition to the colonial, or (b) after the colonial?
Collegial exchange	Invites	<ul style="list-style-type: none"> • This is a fascinating argument - have you looked at the work of Lave and Wenger on communities of practice, because it's absolutely central to what you are saying here. • 'There's a conference on the Gothic coming up in Liverpool in the summer - had you thought of giving a paper' • Yes, this is the same kind of result I came up with after running the experiment 12 times - what did you do to get over that problem about the water filter?

Student attitude change

The main responsible for a thesis, and the correct and timely development of it, is always the student. Hence, if a student has a negative attitude towards the thesis work from the very beginning, the effects could be detrimental to the thesis, and it is (mainly) up to the student to take notice of this and shift attitude. Ellis (2008) claims that attitudes influence learning. Attitude should not be confused with (lack of) motivation; while motivation is defined as those factors which influence behavior and give it direction based on underlying needs, Ajzen and Fishbein (1980) describe attitude as a learned predisposition to respond in a consistently favorable (or unfavorable) manner with respect to a given object. This suggests that learners' attitudes can be formed as a direct result of the conditions which exist within the teaching and learning environment. Hence, the supervisor can and must assist the student to take control of his/her learning process. This could be accomplished by positively influencing the student's cognitively

based attitudes, for example, by making the student aware of the positive progress in the development of the report, and the student's affectively based attitudes, for example, by making the student feel positive about research work, both practically and theoretically (Aronson et al., 2010). The student attitude changes are strongly related to the supervisory management styles model and the supervisory dialogue model (see Table 3).

ANALYSIS AND RESULTS

The following section presents some reflections of the supervisory meeting that consequently led to the construction of the hybrid supervisory model. The results when applying the model are also outlined.

Supervisory style-dialogue-attitude observations

In the following section the observations during the supervision meeting are presented. Based on the analysis of the results, presented in continuation, and the strong resemblance between the models of Gatfield and Alpert, Wisker, and Aronson et al., a composite supervisory model was conceived (Table 3). The model was consequently validated applying the captured dialogues from the observed meeting.

The supervisory meeting lasted for 30 minutes, and it was possible to clearly distinguish three different main supervisory styles (Table 4). During the initial 18 minutes, between 19 and 24 minutes and between 25 and 30 minutes. During the 30 minutes, nine distinct discussions (marked Discussion 1 through 9 in continuation) could be observed. The students' questions and observations are presented as well as the supervisor's answers (minute 0-18) and questions (minute 19-30). The numbers in the table indicate the identified supervisory style-dialogue-attitude patterns (see Table 3). All texts were translated from Swedish to English, and some are presented in a condensed form.

Supervisory management style changes

Five phases could be observed during the supervisory meeting, each representing either a specific supervisory management style or a transition between different styles (Figure 2).

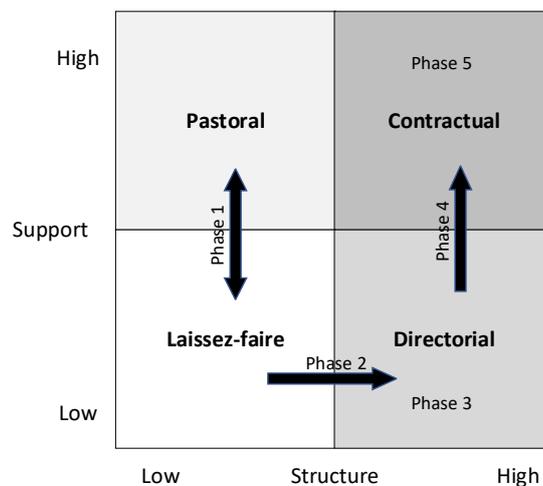


Figure 2. Five distinct supervision phases during the observed supervisory meeting

Table 3. Supervisory style-dialogue-attitude relations

#	Supervisory	Dialogue category	Student attitude change	
L1	Laissez-faire	Tension-relieving	Cognitively based attitudes (weak evidence → strong evidence)	
L2		Informative		
P3	Pastoral	Didactic		
P4		Prescriptive		
P5		Confronting and challenging		
D6	Directorial	Eliciting		Affectively based attitudes (weak evidence → strong evidence)
D7		Supporting		
D8		Encouraging and facilitating		
C9	Contractual	Summarizing		
C10		Clarifying		
C11		Collegial exchange		

- phase 1: The meeting started with discussions in the *pastoral* sector but moved between the *pastoral* sector and *laissez-faire* sector during the first 18 minutes of the meeting (that is, during Discussion 1, 2, 3 and 4)
- phase 2: After 18 minutes, the meeting style moved to the *directorial* sector
- phase 3: During minute 19 to 24, the discussions mainly had a *directorial* style (that is, during Discussion 5 and 6)
- phase 4: After 24 minutes, the meeting style moved to the *contractual* sector
- phase 5: During minute 25 to 30, the discussions mainly had a *contractual* style (that is, during Discussion 7 and 8)
- the meeting ended with a tension-reliever, thus moving back to the *laissez-faire* sector (that is, during Discussion 9)

The *discipline-specific* and *generic* conceptual thresholds that were touched upon during the supervisory meeting were:

- to understand the *content and place* of the various parts in the thesis report. (generic concept)
- to explain about *machine learning* and what is *technically possible* to achieve with a specific machine learning algorithm. (discipline-specific concept)
- how to perform *data collection* and the *preprocessing* of the input data to the machine learning algorithms. (discipline-specific concept)
- to understand the *relation* between the *expectations* of the project and the *achievable/attainable goals*. (generic and discipline-specific concept)

Table 4. Supervisory style-dialogue-attitude observations

0 – 18 minutes	
<i>Discussion 1</i>	
Students <i>'We want to move the theory section before the method section.'</i>	
Supervisor <i>'I have thought about that, and I don't think it's a good idea!'</i>	P4
Supervisor <i>'What you need is a section after the theory section where you describe how you have applied your methods.'</i>	P3
Supervisor <i>'The important thing is to describe the travel, the different choices that you have made.'</i>	P4
Supervisor <i>'You don't always write the theory section in a chronological order, in my point-of-view.'</i>	L2
<i>Discussion 2</i>	
Students <i>'What we have done can be backed up by theory.'</i>	
Supervisor <i>'Yep!'</i>	L1
<i>Discussion 3</i>	
Students <i>'Should we go into details in the algorithms, or ... ?'</i>	
Supervisor <i>'No, you don't have to do that. What I mean is that the theory section is something that supports your work, things that we needed as well as the readers, to be able to understand.'</i>	P4
Supervisor <i>'But at the same time, it is necessary to have a "tree" of concepts.'</i>	P3
Supervisor <i>'You need to think about the introduction section and the purpose of it as it often briefly introduces important terms.'</i>	L2
Supervisor <i>'You also need to refine your research questions to make the readers and examiner understand them.'</i>	L2
<i>Discussion 4</i>	
Students <i>'In other words, we can provide an overview of machine-learning and what it is used for?'</i>	
Supervisor <i>'Yep!'</i>	L1
19 – 24 minutes	
<i>Discussion 5</i>	
Supervisor <i>'Have you had time to look into related work?'</i>	D6
Supervisor <i>'It is important to describe what already exist.'</i>	L2
Supervisor <i>'Have you received any feedback from the company and are they happy with your results so far?'</i>	D6
<i>Discussion 6</i>	
Supervisor <i>'The information that you received from the company, was it structured?'</i>	D6
Supervisor <i>'Have you thought more about how to handle the input data?'</i>	D6
25 – 30 minutes	
<i>Discussion 7</i>	
Supervisor <i>'If you could motivate that it is impossible to realize (impossibility result), that would be an important contribution.'</i>	C10
<i>Discussion 8</i>	
Supervisor <i>'Could you imagine other types of input data, apart from the information that you already have?'</i>	C10
<i>Discussion 9</i>	
Supervisor <i>'How is the time plan for the remainder of your thesis work?'</i>	L1

The main problem when trying to observe the crossing of a conceptual threshold is that it is a process that occurs almost entirely in the head of a student, and it is mostly demonstrated *indirectly* through the quality of the results presented in the thesis report or from the answers provided by the supervisees during the presentation of the thesis. On occasions, though, an

experienced and observant supervisor can *directly* detect a change in the students' behavior, reactions, body language or answers during a supervisory meeting, for example through expressions such as "ahaa" or "now I get it". The goal of the presented hybrid supervisory model is to alleviate the expectations put on a novice supervisor by making visible the potential shortcomings as a thesis supervisor.

DISCUSSION

As can be observed, the supervisory styles of the experienced supervisor moved from *pastoral* and *laissez-faire* (0-18 minutes), to mainly *directorial* (19-24 minutes) and ending as being predominantly *contractual* (25-30 minutes). The analysis of the supervisory meeting made it clear that the changes between the different supervisory styles happen on three different time scales: (1) very slowly, as the initial mindset (or attitudes, as described by Aronson et al., 2010) of students and supervisors change over time and the progress of the thesis, (2) slowly, between different meetings, as different stages in the thesis process require different supervisory styles (as described by Gatfield and Alpert, 2002), and (3) continuously during a single supervisory meeting, as the meeting progresses (as observed during the supervisory meeting). For an unexperienced supervisor, the changes in style would appear to be random and sometimes erratic, while for an experienced supervisor the changes would be planned or even realized on a subconscious level. The analysis also clearly demonstrated that the observed experienced supervisor started the meeting (0-18 minutes) having the students presenting their questions and resolving their doubts and ended the meeting (19-30 minutes) asking questions to the students forcing them to think differently on their work.

Regarding the students' attitudes, after having analyzed the recording of the supervisory meeting, it became evident that during the first 18 minutes the supervisor managed to fortify the students' *cognitively based attitudes*, by answering their questions (*laissez-faire* style supervision; *weak evidence* of improved *cognitively based attitudes*, and *pastoral* style supervision; *strong evidence* of improved *cognitively based attitudes*). After that, during the remaining 12 minutes, the supervisor managed, to some degree, to boost the students' *affectively based attitudes*, by asking relatively simple questions (*directorial* style supervision; *weak evidence* of improved *affectively based attitudes*) and by asking deep level questions (*contractual* style supervision; *strong evidence* of improved *affectively based attitudes*). As can be observed, it is usually more productive for a supervisor to ask (deep) questions, to make the students reflect, than to only answer the students' questions.

CONCLUSIONS

The purpose of the presented hybrid supervisory model is to make visible the progress of a single supervisory meeting and indirectly substantiate the quality of it. By repeating this process during various continuous supervisory meetings, a pattern can be identified. If handled correctly and in a structured fashion, a supervisor can graphically and textually establish his/her individual process as a supervisor as well as identify potential shortcomings. The identified shortcomings can consequently be addressed through directed supervisor training activities, either realized by the individual supervisor himself/herself or through planned and effected university activities. The hypothesis developed during the grounded theory building is that by analyzing several different supervisors during supervisory sessions, including both novice and experienced supervisors, and without having any external interference from the observers, it is possible to identify "good" and "bad" supervisory behaviors. The extension of this hypothesis should be further investigated in future research.

The supervisory process presented in this paper should only be regarded as an example of how the supervisory model could be applied. Still, the presented example illustrates the supervisory process of an experienced supervisor and could thus be looked upon as a good example of possible formulations applied during a supervisory meeting for the supervisees to progress in their thesis work process. By addressing standard 10 (through individual or university supervisory training activities), standard 8 will indirectly be addressed as well (through better implemented advanced student learning-activities).

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