

# **Self-Regulated Learning in Medical Clerkships**

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## **Abstract**

**In medical education, a goal of students' first clerkship is that students develop self-regulation for learning in a realistic medical context. Self-regulated learning (SRL) is an active process that is influenced by personal and contextual influences. An intervention to support third-year medical students' SRL is tested. Tutor and student regulation in feedback conferences were measured through audio taping. Students' perceptions of interpersonal tutor behaviour and student self-efficacy influence SRL and were measured through questionnaires. Results show that although the tutor did the most of the regulatory work, indirect tutor regulation prompted students to reflect on their learning experiences and show student regulation in the conferences. According to students, quality of feedback was high and interpersonal tutor behaviour was close to ideal tutor behaviour. Self-efficacy increased significantly during the clerkship. The effects of the intervention are discussed, these were only slightly visible.**

## **1. Introduction**

All professional behaviour is characterized by a high level of self-regulation. A professional should be able to observe, criticize and improve his or her own performance. To become professionals, students have to develop this self-regulation. The central theme in this study is the development of self-regulated learning (SRL).

### *1.1 Teacher versus self-regulation*

The past decades, a changing vision on the role of students in learning activities has led to changes in almost every educational setting. Constructivism has influenced the vision on effective learning. Therefore, students' independency, responsibility for learning and self-regulation has become more and more important. This is especially true in competence-based education (Simons, 2003), which is found in vocational education but also in medical education.

According to King (1997), regulation of learning is a continuing process that ideally changes over time from other-regulated learning to self-regulated learning (SRL). Many teachers recognise the importance of student self-regulation during their learning processes. According to teachers, a shift of teacher-regulated learning to student-regulated learning should be gradually attained (Prins & Mainhard, 2008). The development of SRL is seen as a gradual change in responsibility for learning, from teacher-regulated, via co-regulated, to student-regulated learning (Hadwin, Wozney & Pontin, 2005).

Also in medical education, the way students are expected to learn has started to change from passive, hierarchy-driven to active, self-regulated learning. In Utrecht, students start a clinical clerkship in internal medicine in the third year of their studies. The most important

goal of this first clerkship is to *learn* how to learn in a clinical setting. In other words, SRL needs to be developed. SRL is especially important in the context of a clerkship, because for these students, their learning environment has never been this unstructured before.

The remainder of this theoretical framework describes theory on SRL. It explains why students should develop SRL and what factors can influence this development.

### *1.2 What is SRL?*

Talking about SRL, it is essential to know firstly what is meant by SRL. An often used definition is Zimmerman's: "...the degree to which students are metacognitively, motivationally and behaviourally active participants in their own learning process" (1986a, in: Zimmerman, 2008, p. 167).

Researchers have different focuses when they write about SRL. Therefore, for this study SRL is summarized and visualized in a model (figure 1). The different SRL activities take place in different phases, and are influenced by personal and environmental influences, such as self-efficacy and teacher behaviour.

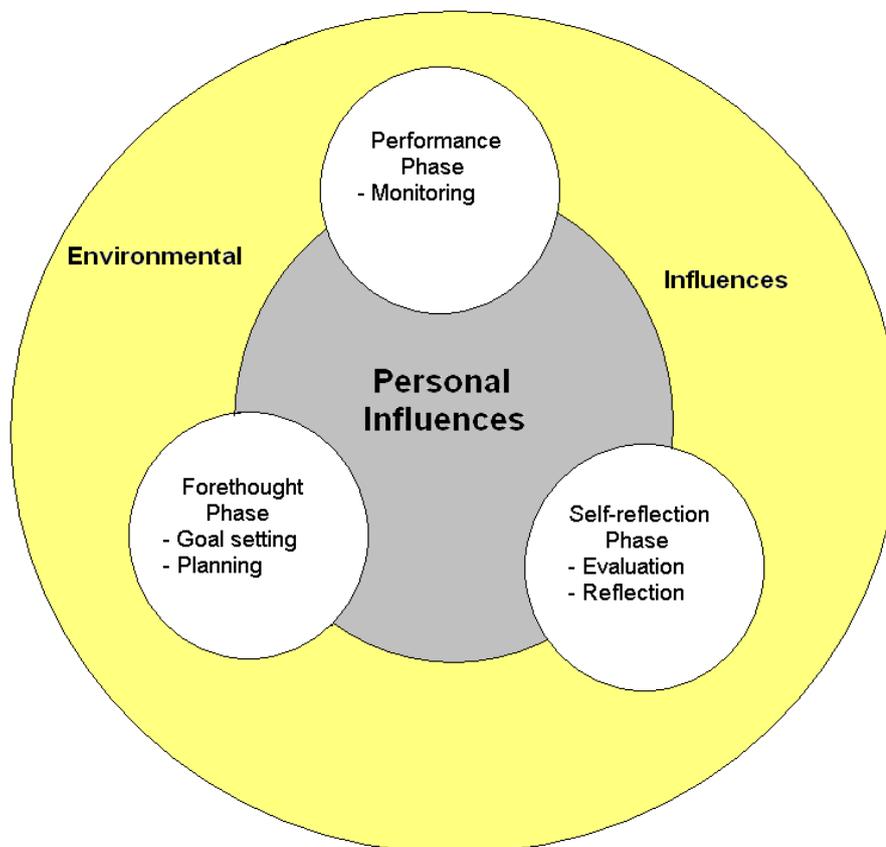


Figure 1: *Phases, Activities and Influences in SRL*

SRL is often presented as a cyclical process (Hadwin et al., 2005; Stone, 2000). Authors distinguish *phases* in the SRL process, such as the starting, performing and finishing phase (Van den Boom, Paas & Van Merriënboer, 2007) or, in other words, the forethought, performance and self-reflection phase (Zimmerman, 2000). In these phases, different self-regulating *activities* take place, such as defining own learning goals, selecting and using learning strategies, planning and monitoring own learning process and evaluating and reinterpreting learning tasks by means of internal or external feedback (Stone, 2000; Van den Boom et al., 2007). SRL is a complex process that has to do with cognitive, meta-cognitive, behavioural and motivational aspects (Hadwin et al., 2005). SRL therefore is *influenced* by the individual's attitude (e.g. self-efficacy, motivation), the individual's behaviour (e.g. help-seeking, strategy planning, self-observation) and the learning environment (e.g. guidance from tutor) (Schunk, 1990; Zimmerman, 1990).

In the context of a medical clerkship, SRL can be shown on multiple levels. Students regulate workplace learning when they set goals, reflect on learning experiences, plan learning experiences and monitor and evaluate their own functioning. On another level, students can show SRL in organized feedback conferences with the tutor. We speak of self-regulation when they pose questions, ask for alternatives, ask for help, reflect and evaluate their own functioning. In this study, the assumption is that students who have a high level of self-regulation on the workplace, will also have a high level of self-regulation in the feedback conference, and the other way around.

### *1.3 Advantages of a high level of SRL*

Why should students self-regulate their learning? Several reasons are found in literature. Self-regulation prepares students on acting as independent lifelong learners (Short & Greer, 1994). Especially professionals like medical staff always need to be capable of evaluating their own capacities and anticipate on learning needs. According to Vermunt (In Van den Boom et al., 2007), SRL prepares students for future contexts where professionals are supposed to maintain and to extend previously acquired competencies. So, development of SRL while learning is a good preparation for future learning. Besides this, because of better application of learning strategies and motivational aspects, self-regulation also has a positive influence on learning outcomes (Schunk, 2005).

#### *1.4 Influences on SRL*

If a high level of SRL is preferable, how can students be supported to develop their SRL-skills? Therefore, we take a closer look on the influences on SRL. As we see in the model, SRL is influenced by individual as well as environmental aspects (Hadwin et al., 2005; Stone, 2000). We will zoom in on self-efficacy (individual), a tutors feedback (environmental) and a tutors level of guidance (environmental).

A very important individual influence of SRL is students' self-efficacy (Pajares, 2002). Self-efficacy refers to beliefs concerning one's own capacities to attain a certain (learning) goal (Schunk, 1990). Self-efficacy influences every phase of SRL. In the forethought phase, students with higher self-efficacy set higher goals for themselves. In the performance phase, they use more effective learning strategies and in the self-reflection phase, they have more accurate self-evaluations (Pajares, 2002). Research confirms that self-efficacy has a significant influence on the occurrence of various aspects of self-regulation (Bouffard-Bouchard, Parent & Larivée, 1991).

Feedback is seen as one of the most powerful influences on learning (Hattie & Timperley, 2007). Hattie & Timperley (2007) distinguish four forms of feedback, which are 1. feedback about task, 2. feedback about process, 3. feedback about self-regulation and 4. feedback about the self as a person. Feedback about self-regulation concerns the degree and quality of self-assessment, willingness to use feedback, self-confidence, ideas about success and failure, willingness to seek help, engagement in task, self-efficacy and conceptions of learning. This kind of feedback can lead to more involvement with the task, more self-efficacy and new conceptions on learning (Hattie & Timperley, 2007). Feedback therefore is one of the influences on the development of SRL.

Another environmental influence on SRL, especially in interaction with a tutor, is the amount of guidance the teacher provides. Vermunt (1992) describes the interaction between three gradations of external guidance and three gradations of self-regulation. External guidance by the teacher can be strong, shared or loose. Self-regulation by the student can be high, average or low. Self-regulation develops in a situation of 'constructive friction'; this occurs when a teacher uses low guidance when the learner has average self-regulation skills and when the teacher uses shared guidance when the learner shows a low level of self-regulation. In this study, the degree of external guidance is linked to interpersonal teacher behaviour styles. Interpersonal teacher behaviour styles are described and student perception of these styles is successfully measured with a questionnaire, the QTI (Wubbels, Brekelmans, den Brok and Van Tartwijk (2006). Eight different styles are distinguished on two

dimensions; influence and proximity. Because of the interactive character of a feedback conference, a tutors interpersonal behaviour style and a students perception of this style are of influence on a students' level of self-regulation (Mainhard, Van der Rijst, Van Tartwijk, & Wubbels, 2009; Prins & Mainhard, 2008).

Many interventions and techniques has been designed to affect students self-regulation (Boekaerts, Pintrich & Zeidner, 2000). Tutors can add content-free prompts in their feedback, which invite students to reflect and regulate by themselves (Chi, Siler, Jeong, Yamauchi, & Hausmann, 2001). To support self-monitoring and self-evaluation, tutors should mostly include feedback about the learning process instead of the learning product or result (Stone, 2000). Van den Boom et al. (2007) use two ways to stimulate SRL; reflection prompts and external feedback. Reflection prompts are questions or tasks which trigger students to reflect on their learning. Prins and Mainhard (2008) used meta-cognitive prompts to stimulate self-regulation in feedback conferences. In their study, students in vocational education prepared two questions for the feedback conference with their teacher. However, effects on self-regulation were limited. Another way to support SRL is the modeling of self-regulatory activities by a teacher (Zimmerman, 1990).

As we see, teacher behaviour (through feedback, prompts and modelling) is extremely important for the development of SRL. But, as is argued by Prins and Mainhard (2008), there should also be given more attention to a student's role in developing SRL. When the teacher's behaviour enables self-regulation, students themselves should actively reflect on their learning processes, set goals and pose questions in a dialogue with the teacher. In this study, an intervention aimed to activate students has been tested.

### *1.5 Problems with SRL*

The development of SRL does not always appear as good, fast or spontaneous as one would possibly like. A first problem is that SRL in a socio-cognitive perspective is situation specific (Hadwin et al., 2005). Students' level of self-regulation therefore may vary in different contexts. This is seen in vocational education where students show very little self-regulation in feedback dialogues while outside their school context they show high levels of self-regulation (Prins & Mainhard, 2008). There are, theoretically, two explanations when students do not show self-regulation. 1) They do not *have* the appropriate SRL skills available (availability deficiency) or 2) They fail to spontaneously *enact* the appropriate available SRL skills (production deficiency). If students don't have the appropriate SRL skills available, these skills should be developed with instructional support or training. If students appear to

have SRL skills but don't use them, the *use* of these SRL skills should be prompted (Prins, Sluijsmans and Kirschner, 2006).

Second, the modern educational concept of competence-based education is not always in line with students' abilities and practice. In the already cited study of Prins and Mainhard (2008), students in vocational education declared that more independency and responsibility for learning (more SRL) is required than they are used to. In feedback dialogues, they like a high level of teacher-regulation, while the educational concept requires active self-regulation by the student, because this should enhance learning. So, students' and tutors' expectations do not automatically correspond.

A third difficulty concerns the measurement of SRL (Pintrich, 2004). For a long time, only retrospective report questionnaires were used to measure SRL and nowadays, these are still used frequently (e.g. Van den Boom et al., 2007). Only recently, also observational techniques and innovative software were used to measure SRL (e.g. Hadwin et al., 2005; Zimmerman, 2008). Self-report questionnaires can definitely help, but it is worth using rich data like observation to measure SRL in a more independent way. That is why in this study this relatively new and complex way of rich data collection has been used (see table 1 for descriptions).

### *1.7 Research questions and hypotheses*

This study examines the level of medical students' SRL in feedback dialogues and investigates a way to support the development of SRL. The effects of an intervention meant to support SRL in feedback conferences are investigated. Because many other aspects can influence the development of SRL, in this study characteristics of the feedback conference, interpersonal tutor behaviour and student self-efficacy are involved. Research questions were:

#### SRL in feedback conferences

- What degree of SRL is shown by 3<sup>rd</sup> year medical students and does this increase during the clerkship?
- What feedback subjects are attended in the feedback conferences?
- Does SRL increase when the conference is prepared with a reflection task?

#### Student perceptions

- How is the feedback given by the tutor evaluated by students?
- What are student perceptions of interpersonal tutor behaviour?

- What is the influence of a reflection task on student perceptions of interpersonal tutor behaviour?

#### Student self-efficacy

- Does student self-efficacy increase during the clerkship?
- Does preparation with a reflection task lead to an increase in student self-efficacy?
- Does SRL in feedback conferences correlate with self-efficacy?

An increase of self-regulation during the clerkship is expected because students need to take more responsibility for their learning processes compared to the pre-clinical education. Also, more self-regulation in feedback conferences is hypothesized as an effect of the reflection task, because the task is meant to improve SRL. It therefore is hypothesized that SRL in feedback conferences is higher in the experimental group compared to the control group. It is expected that tutor behaviour is considered as less leading in the experimental group compared to the control group. An increase of self-efficacy during the clerkship is expected in both groups. However, if self-regulation is higher in the experimental group, as we expect, self-efficacy will be higher, too. Regarding theory on self-efficacy, we expect to find a positive correlation between SRL and self-efficacy.

## **2. Methods**

### *2.1 Participants*

Participants were 29 third-year medical students who had their first experience in a clerkship in internal medicine. All students (7 male, 22 female) who started their clerkship while this study was carried out, agreed to participate in the study. The control condition included ten students, the experimental condition included nineteen students. This unequal partitioning was due to differences in student group size. Students were tutored by a female tutor who was experienced with coaching and evaluating students. Another female tutor replaced her in three out of 46 used feedback conferences, which had the same structure as usual (see figure 2).

### *2.2 Design and procedure*

From the start of the study, every two weeks a new group of 3-7 medical students started a six week lasting clerkship in one of the departments of internal medicine in the Utrecht hospital. They worked individually but could rely on guidance from medical staff and the tutor we worked with. Six groups participated in the study: group 1 and 5 as control groups, group 2, 3, 4 and 6 as experimental groups. Data collection was spread out over fourteen weeks.

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At a starters meeting on the first day of the clerkship, students were asked to complete a questionnaire on motivational and self-efficacy aspects for the coming clerkship. Students in the experimental group were handed a reflection task, which was the intervention meant to raise SRL in the first feedback conference with the tutor after three weeks. This feedback conference was meant to talk about the student's medical acting, professional behaviour and his or her learning process, assessed by means of a portfolio that comes with their education. In this feedback conference, attention was paid to the student's self-regulated learning (e.g. goal setting, learning strategies, motivation, self-assessment, planning, time-management).

Figure 2: *The Feedback Conference Protocol*

1. Start voice recorder, say date, time and student number.
2. Introduce the goal of the conference.
3. Prompt the student to self-regulate the conference on his learning process.
4. Add things that the student didn't come up with yet.
5. Prompt the student to make plans for future learning, try to let the student self-regulate.
6. Add your own insights when necessary.
7. Conclude the conference.
8. Stop the voice recorder.
9. Ask the student to answer the questionnaires and seal the envelope.

The tutor was instructed in advance to include these topics in the feedback conference and agreed to use a protocol for the feedback conferences (figure 2). Feedback conferences were audio taped. They lasted from 10-20 minutes and transcript length ranged between 2000 and 4000 words. After the first feedback conference, the students were asked to complete two questionnaires, one on interpersonal perspectives of tutor behaviour and one on quality of feedback.

After six weeks of learning, the students had a second feedback conference which was meant to evaluate the learning process with the student and to give more feedback. This second feedback conference was also audio taped. After the second feedback conference, the students were asked to complete three questionnaires, one on interpersonal perspectives of tutor behaviour, one on motivational and self-efficacy aspects for a next clerkship and one on their idea of ideal tutor behaviour.

### *2.3 Intervention*

Students in the experimental group prepared and evaluated the first feedback conference by means of a reflection task. This task was based on three phases of self-regulation; the forethought phase, the performance phase and the self-reflection phase (Zimmerman, 2008). Students reflected on strong and weak points of their learning in the first three weeks and set goals for the feedback conference by formulating two questions for the tutor. Students were asked to e-mail their preparation to the researcher two days before the conferences to be sure that they would prepare the conference properly. After the conference, students were asked to indicate whether they had actually posed their questions and to evaluate the tutor's answers on their questions. With this intervention, it was tried to prompt students to actively participate in the feedback dialogue.

### *2.4 Instruments*

#### 2.4.1 (Self-)regulation in feedback conferences

All feedback conferences between tutor and students in groups 1 to 5 were audio taped and the transcripts and audio files were used to examine (self-)regulation. Group 6 was tutored by another tutor and therefore has been left out in this part of the study. Due to practical circumstances, sixteen out of 46 conferences were not transcribed but coded while listening to the audio file (= 35%). The first step was to divide all transcripts into segments. Every change of speaker is a natural segment, but not every utterance also means a change of regulation of the conference (Hadwin et al., 2005). Therefore, only meaningful shifts of regulation were distinguished in separate segments (see Karasavvidis, Pieters & Plomp, 2000, for a useful description of the segmentation).

The second step was to code the segments in the following way. A segment first got an ownership code, dependent on the speaker. Then, the segment was coded as direct or indirect regulation. We used four codes: 1. *tutor-direct regulation*, when the tutor initiated and did the self-regulatory work, for example by evaluating the student's time-management behaviour. 2. *tutor indirect regulation*, when the tutor invited the student to do the self-regulatory work, for example by posing a question like 'what are your strong points?'. 3. *student indirect regulation*, when the student requested help from the tutor to self-regulate learning, for example by posing a question 'how can I do better in this task?' or 4. *student direct regulation*, when the student initiated and completed the self-regulatory act alone, for example by explaining how he or she carried out a certain task (after Hadwin et al., 2005). Examples of these codes, coming from this study, can be found in table 1.

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All segments were independently coded two times and coding showed an intra-rater reliability (Cohen's Kappa) of .88. Because not all conferences had the same length, percentages of all four codes were calculated and used for analysis. This way of analysis showed the degree of students' self-regulation and the tutor's style of regulating a feedback conference.

Table 1: *Descriptions and Examples of Codes from the Study, Participant nr. 16*

<i>Regulation code</i>	<i>Description of code</i>	<i>Examples from data</i>
Tutor Direct	<i>Segment is dominated by tutor direction. Tutor says or demonstrates what it is or how to do it or how to think about. Tutor initiates action, reflection, evaluation, etc.</i>	<i>“Jij moet een DD in je hoofd hebben bij een bepaalde klacht, aan de hand daarvan moet jij inderdaad de patiënt, dat is heel moeilijk. Dat leer je ook alleen maar door ervaring. Dus in het begin is dat ook gewoon...”</i>
Tutor Indirect	<i>Segment involves the tutor trying to get the student to regulate behaviour, motivation, cognition, etc. Tutor tries to get the student to say or demonstrate what it is or how to do it or how to think about. Tutor initiates but the emphasis is on getting the student to act, reflect, monitor, evaluate, etc.</i>	<i>“Hoe zou je voor jezelf bijvoorbeeld dan in deze laatste week toch voor een beetje continuïteit kunnen zorgen? Heb je daar al een beetje over nagedacht?”</i>  <i>“Nou leuk, en um wat vind je bij jezelf iets waar je nog aan zou kunnen werken de komende drie weken? Wat zou nog een verbeterpuntje kunnen zijn?”</i>
Student Indirect	<i>Student tries to get the tutor to say or demonstrate what it is or how to do it or how to think about. Students asks for help, guidance, feedback, information, etc. Student may provide leads for the tutor to fill in or to act, reflect, monitor, or evaluate.</i>	<i>“Moet dat, moet je dan uit de anamnese nog...?”</i>  <i>“Dus dan zou je eigenlijk, het handigst is om van tevoren al een hele DD op papier te hebben en dan...”</i>
Student Direct	<i>Student initiates action or reflection. Launches into a discussion or review of what they have done or what they know.</i>	<i>“Nou ja soms weetje die zaalartsen hebben allemaal hun eigen ding en dan voel ik me af en toe echt zo van oké een beetje zo van wat willen ze nu van mij? En waar moet ik heen? Of weetje dat ik met die mee ga of met die. Een beetje onduidelijk af en toe, maar.”</i>  <i>“Ja precies, dan vertelt de patiënt weer iets over dit en dan zeg ik ‘o ja’ en dan ga ik dat uitvragen weet je. Niet dat ik, ik zou meer de structuur moeten hebben.”</i>

### 2.4.2 Goal setting and Request for opinion

To gather more specific data on some regulatory activities, two expressions of (self-) regulation were coded. We wanted to know how often students and tutor would set learning goals and request for the others opinion. Therefore, when appropriate, extra codes were given to segments that contained goal setting or a request for the others opinion, by student or by tutor. Examples are given in table 2. To correct for differences in length of feedback conferences, percentages were calculated.

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Table 2: Examples of Goal Setting and Requests for Opinion by Tutor and Student

Goal setting	<p><b>T:</b> “Dus het is heel goed om het grote overzicht te zien, maar je moet soms daardoor niet dingen uit het oog verliezen. Toch proberen bepaalde cues, bepaalde dingen uit de anamnese ook mee te nemen en die ook mee te nemen in je dd (differentiaal diagnose, ed.) bijvoorbeeld.”</p> <p><b>S:</b> “Nou ik vind het ook wel fijn gewoon voor mezelf, daar werk ik ook naartoe hoor om het gewoon allemaal lekker op tijd af te hebben, want anders dan... Ik heb geen zin om in de stress te raken voor die verslagen.”</p>
Request for opinion	<p><b>T:</b> “Want hoe zou je daarop kunnen voorbereiden bijvoorbeeld? Heb je een idee hoe je dat zou kunnen aanpakken, om daar meer, beter mee om te gaan?”</p> <p><b>S:</b> “Moet dat, moet je dan uit de anamnese nog?”</p>

### 2.4.3 Feedback conference subjects

The segments were not only coded for regulation, but also for the subject of the feedback talk. Four codes were used (after Hadwin et al., 2005). 1. *Cognition*: the segment focused on awareness and emergent development of factual and procedural knowledge (e.g., perception, comprehension, managing prior knowledge). 2. *Behaviour*: the segment focused on tactics and strategies (e.g., time management, effort planning, persisting, help-seeking and self-observation). 3. *Motivation*: the segment focused on awareness and management of motivational processes (e.g., interest, efficacy, goal-orientation, value). 4. *Evaluation/Reflection*: the segment involved reviewing and making judgments about task engagement, task performance, task complexity, task difficulty and task criteria. Not every segment was coded with one of these four codes, codes were only given when appropriate. Percentages were calculated to correct for length of conferences.

### 2.4.4 Feedback perceptions

To get insight in students' perceptions of the quality and impact of feedback given by the tutor, we used a questionnaire. This questionnaire measured cognitive (to what extent was the feedback clear, positive, usable, understandable and helpful), behavioural (to what extent was the feedback activating to change learning behaviour), and affective perceptions (to what extent led the feedback to positive or negative feelings). The negatively posed items were recoded. Table 3 shows item examples of this questionnaire. Cronbach's alphas for the three scales were high, as well as for the total of reaction on feedback (Cognitive  $\alpha = .86$ , Behavioural  $\alpha = .73$ , Affective  $\alpha = .82$ , Total feedback  $\alpha = .88$ ).

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Table 3: Item examples for Cognitive, Behavioural and Affective Perceptions of Feedback

Code	Item examples	Hele- maal niet mee eens	1	2	3	4	Hele- maal mee eens
Cognitive	Ik begrijp de feedback.	1	2	3	4	5	
Behavioural	Naar aanleiding van deze feedback ga ik vaker aan anderen feedback vragen over mijn gedrag op de werkvloer.	1	2	3	4	5	
Affective (positive)	De feedback geeft me een goed gevoel.	1	2	3	4	5	
Affective (negative)	Deze feedback geeft me een vervelend gevoel.	1	2	3	4	5	

### 2.4.5 Student perceptions of tutor behaviour

To measure students' perceptions of tutor behaviour and students' idea of ideal tutor behaviour, a questionnaire on supervisor-student interaction was used. This questionnaire was a translated and improved version of the QSDI (Questionnaire on Supervisor-Doctoral student Interaction (Mainhard et al., 2009)). The questionnaire contains 8 x 8 questions which correspond to eight behaviour types. Examples of items are showed in table 4. Tutor behaviour was measured on two dimensions; influence and proximity (figure 3). Scores on the two dimensions were calculated using a QSDI formula (Mainhard, personal communication) and influence and proximity scores could theoretically vary between -2.6 (very low) and +2.6 (very high). We compared the perceptions of students in both conditions by using t-tests for independent groups ( $\alpha = .05$ ). Cronbach's alphas for the measurement of the eight behaviour types were acceptable, mean  $\alpha = .73$ , (min .54, max .84). No correlation between the dimensions was visible, as it should be.

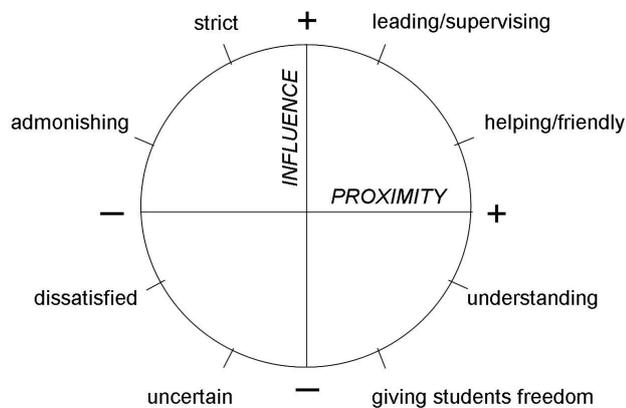


Figure 3: Eight Behaviour Types on Two Dimensions Influence and Proximity

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Table 4: *Item Examples of Tutor Behaviour Questionnaire*

<i>Behaviour type</i>	<i>Item example</i>
Leading/supervising	Geeft structuur aan onze gesprekken
Helping/friendly	Denkt mee, als ik iets voorstel
Understanding	Vindt mijn ideeën snel goed
Giving students freedom	Laat mij mijn gang gaan
Uncertain	Reageert aarzelend op mijn ideeën
Dissatisfied	Is ontevreden over wat ik doe
Admonishing	Wijst me op al mijn fouten
Strict	Stelt hoge eisen aan wat ik doe

### 2.4.6 Self-efficacy

To examine students' self-efficacy at the start and end of their clerkship, the Motivated Strategies for Learning Questionnaire (MSLQ) was used. The original items (Duncan & McKeachie, 2005) were adapted by Duijnhouwer (personal communication) to measure self-efficacy for behavioural performance instead of cognitive performance, and the list was slightly adapted by the researcher for use in medical context. Self-efficacy was measured by eight items on a 5-point Likert scale. Cronbach's alpha was .87. This is an example of an item:

	<i>Hele- maal niet mee eens</i>					<i>Hele- maal mee eens</i>	
12		Ik heb er vertrouwen in dat ik de basisvaardigheden die in dit co- schap aan bod komen, onder de knie kan krijgen.	1	2	3	4	5

## **3. Results**

### 3.1 (Self-)regulation in feedback conferences

Mean percentages of student and tutor regulation were calculated for the first and the second feedback conference, for the whole (experimental and control), the experimental and the control group. These are shown in table 5.

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Table 5: Mean Percentages of Regulation in First ( $t1$ ) and Second ( $t2$ ) Feedback Conference, for Whole ( $n=23$ ), Control ( $n=10$ ) and Experimental group ( $n=13$ )

Regulation	Whole group				Control group				Experimental group			
	$t1$		$t2$		$t1$		$t2$		$t1$		$t2$	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Tutor Direct	32.2	4.4	28.0	3.7	32.1	5.7	28.6	3.5	32.3	3.3	27.6	3.9
Tutor Indirect	18.4	4.4	21.5	5.4	18.3	4.6	19.6	5.8	18.4	4.4	22.9	4.8
Student Indirect	4.1	2.5	3.9	2.2	4.0	2.3	4.4	2.0	4.1	2.8	3.6	2.4
Student Direct	25.5	4.4	27.1	4.0	25.6	6.2	28.5	4.3	25.5	2.6	26.1	3.4

We tested for differences between the first and the second feedback conference independent of experimental condition. Here, a significant *decrease* of tutor direct regulation is found in the second feedback conference compared to the first ( $t(22) = 3.03, p = .006, d = .63$ ). This means the tutor uses more direct regulation in the first feedback conference compared to the second. Also, we found a significant *increase* of tutor indirect regulation in the second conference compared to the first ( $t(22) = -2.54, p = .019, d = .53$ ). Tutor indirect regulation invites students to reflect on their own learning and self-regulate their feedback conference. No differences were found for student-regulation. The experimental and the control group were compared by using a t-test for independent groups. No differences were found between both groups.

### 3.2 Goal setting and request for opinion

Both the tutor and the students used the regulatory strategies of goal setting and request for opinion. The mean percentages for the first and the second feedback conference, again for the whole, the experimental and the control group, are shown in table 6.

Table 6: Mean Percentages for Goal Setting and Request for Opinion in First ( $t1$ ) and Second ( $t2$ ) Feedback Conference, for Whole ( $n=23$ ), Control ( $n=10$ ) and Experimental group ( $n=13$ )

		Whole group				Control group				Experimental group			
		$t1$		$t2$		$t1$		$t2$		$t1$		$t2$	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Goal setting	Tutor	10.8	3.5	5.5	2.9	10.3	3.3	6.4	2.7	11.2	3.8	4.8	3.0
	Student	5.6	2.5	3.3	2.0	5.0	1.9	4.5	2.3	6.0	2.9	2.4	1.1
Request for opinion	Tutor	10.2	4.2	12.2	3.9	8.4	4.4	12.3	5.2	11.6	3.7	12.0	2.7
	Student	3.3	2.3	2.8	2.2	3.4	2.9	4.0	2.3	3.3	1.9	1.8	1.6

First we looked at differences between the first and the second feedback conference. In the second conference, both tutor and student set less goals compared to the first conference. These decreases in goal setting were statistically significant ( $t(22) = 5.93, p < .000, d = 1.24$  for tutor goal setting and  $t(22) = 3.35, p = .003, d = .70$  for student goal setting). No differences were found for request for opinion.

When comparing the experimental and the control group, differences were significant considering student goal setting and request for opinion in the second conference.

Unexpectedly, in the control group student set more goals ( $t(21) = 2.61, p = .02$ ) and requested more often for the tutor's opinion compared to the experimental group ( $t(21) = 2.7, p = .014$ ).

### 3.3 Feedback conference subjects

Four labels were used to code for feedback subjects; cognition, behaviour, motivation and evaluation/reflection. Mean percentages were calculated for the first and the second feedback conference, first for the whole group and separate for the experimental and the control group. These percentages are shown in table 7. Differences were tested within the two conference moments and between groups but no changes were found.

However, a repeated measures test shows that the facets cognition, behaviour, motivation and evaluation/reflection clearly don't get equal attention in the feedback conferences ( $F(1.95) = 37.4, p < .000$ ). Most attention goes to *evaluation/reflection*, this is about how tasks are and should be performed. Least attention goes to aspects of cognition.

Table 7: Mean Percentages for Four Subjects in First and Second Feedback Conference, for Whole (n=23), Control (n=10) and Experimental group (n=13)

Subjects	Whole group				Control group				Experimental group			
	t1		t2		t1		t2		t1		t2	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Cognition	3.0	2.5	3.3	3.0	2.5	2.1	2.5	2.3	3.4	2.8	3.8	3.4
Behaviour	13.3	5.9	10.1	6.4	12.9	5.5	11.1	5.8	13.6	6.4	9.3	7.0
Motivation	8.7	3.6	9.8	5.3	7.3	3.8	10.3	3.9	9.7	3.3	9.4	6.3
Evaluation/Reflection	18.0	6.0	15.4	6.0	17.8	6.2	16.1	4.9	18.2	6.0	15.0	7.0

### 3.4 Feedback perceptions

Table 8 shows the means and standard deviations for students' feedback perceptions of the first feedback conference. According to students, the quality of this feedback was high, with a total of 3.8 on a 5 point scale. Differences between the control and the experimental group were found only on the behaviour scale. In the control group, students thought the feedback was more behaviourally activating compared to the experimental group ( $t(26) = 3.99, p < .000$ ).

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Table 8: Mean Scores for Cognitive, Behaviour, Affective and Total Perceptions of Feedback in First Conference, for Whole (n=28), Control (n=10) and Experimental group (n=18)

	Whole group		Control group		Experimental group	
	M	SD	M	SD	M	SD
Cognitive	4.3	.5	4.5	.5	4.2	.5
Behaviour	3.2	.6	3.6	.3	2.9	.1
Affective	4.0	.6	4.0	.5	4.0	.6
Total	3.8	.5	4.0	.4	3.6	.5

### 3.5 Student perceptions of tutor behaviour

Three measurements of students perceptions of tutor behaviour were done, one for the first feedback conference, one for the second and one for students' idea of the 'ideal' tutor.

Outcomes were clear, the tutor scored high on the whole right spectrum of the model and low on the left spectrum, except the *strict* part where the tutor scored average. Influence and proximity dimensions were calculated (table 9) which showed positive, high levels for proximity and positive but lower levels for the influence dimension.

The tutor's behaviour in the first and in the second conference did not differ according to students, it even showed the same patterns as the students' ideal tutor. In all three measurements, scores for the right spectrum were high and scores for the left spectrum were low.

Table 9: Mean Scores for the Dimensions Influence and Proximity of Tutor Behaviour in First, Second and Ideal Conference, for Whole (n=29), Control (n=10) and Experimental group (n=19)

		Whole group		Control group		Experimental group	
		M	SD	M	SD	M	SD
Influence	First	.27	.11	.32	.09	.24	.12
	Second	.26	.10	.30	.09	.24	.11
	Ideal	.33	.13	.40	.15	.30	.10
Proximity	First	.79	.19	.81	.09	.78	.23
	Second	.83	.17	.88	.14	.80	.18
	Ideal	.91	.14	.87	.15	.93	.14

One significant difference between the experimental and the control group was found for the dimension *influence* for ideal tutor behaviour. Students in the control group like a more dominant tutor compared to the experimental group ( $t(26) = 2.06, p = .049$ ).

### 3.6 Self-efficacy

Data collection started with a questionnaire to get insight in medical students' self-efficacy when they started their first clerkship in internal medicine. Mean self-efficacy was 3.23 (sd .53) on a 5-point Likert scale. After six weeks a second measurement revealed a small but significant increase in self-efficacy; to mean 3.66 (sd .58) ( $t(28) = -4.13, p < .000, d = .77$ ). The correlation between initial self-efficacy and self-efficacy in the end was  $r = .51; p = .005$ .

In the experimental group mean initial self-efficacy was 3.35 (sd .46), in the control group this was 3.00 (sd .62). Initial self-efficacy, as expected, did not differ between the groups ( $t(27) = -1.57, p = .14$ ). Regarding self-efficacy after six weeks, the experimental group (mean = 3.71, sd = .53) did not show a bigger increase than the control group (mean = 3.55, sd = .70), ( $t(27) = -.80, p = .49$ ).

### 3.7 Self-efficacy and self-regulation combined

One research question considered the correlation between self-efficacy and student-regulation. As expected, a significant correlation was found between initial self-efficacy and student-direct regulation in the first conference ( $r = .423, p = .045, n = 23$ ). Also, a significant correlation between self-efficacy in the end and student-indirect regulation in the second conference was found ( $r = .533, p = .009, n = 23$ ).

## **4. Conclusion and Discussion**

In this study, self-regulated learning in feedback conferences between student and tutor in medical context has been examined. Several influencing factors like feedback perceptions, tutor behaviour perceptions and student self-efficacy have been included in the study. A distinction was made between direct and indirect regulation, where direct regulation means regulation by the speaking person, while indirect regulation is related to the activation of the other person (Hadwin et al., 2005).

Concerning SRL, students showed a mean student-direct regulation of about 26% of the segments, somewhat lower than the percentages for tutor-direct regulation. Student-direct regulation included for example sharing strong and weak points and telling the tutor about the workplace learning process. This is a hopeful sign that the feedback conference really is a feedback dialogue and not just a one-way sharing of the tutor's point of view. The tutor-indirect regulation is indispensable, because it prompts students to self-regulate. In tutor education, this prompting and giving the opportunity to self-regulate should be a major theme.

An interesting and theoretically understandable result is the decrease of tutor direct regulation and the increase of tutor indirect regulation in the second feedback conference compared to the first. This means the tutor, conscious or unconscious, left more opportunity for self-regulation to the student later in the clerkship.

The amount of student-indirect regulation was somewhat disappointing. Students showed a mean student-indirect regulation of about 4% of the segments, much lower than the tutors indirect regulation of about 20%. This means students didn't pose many questions nor prompted the tutor to give a reaction on or an advice about their learning processes. Self-regulation can develop even more if we try to find ways to get students engaged in these activities. The preparation task, meant to enhance self-regulation, did not make a difference on this aspect of regulation in the experimental group. A plausible reason for low student-indirect regulation is that the questions students had were already included in the conference by the tutor. Because of the many possibilities the tutor gave the students to regulate the conference, they did not have to ask for this themselves. All students had a chance to reflect on their learning themselves because of the structure kept in the conferences by the tutor. The intervention, therefore, did not make a difference. It should be said that this study examined mainly amounts of self-regulation. For future research it would be interesting to pay more attention to quality of self-regulation, for example to study the quality of student questions in the conference.

Looking at the questions students in the experimental group prepared, most of the questions sounded like: "How can I improve my ... (reports, knowledge, medical skills, medical attitude, time-management) " or just: "What should I do better?". These kind of questions were answered in the feedback conferences because the tutor gave her feedback after the phase of student self-reflection. This can explain why no differences are found between the experimental and the control condition.

Concerning the regulating activities of goal setting (mostly direct regulation) and request for opinion (mostly indirect regulation), these occurred more in the first conference than in the second conference. An explanation can be that the character of the second conference was more on evaluation and less on improvement, because it took place at the end of the clerkship. However, also at the end of the clerkship a feedback dialogue should be used to formulate goals for a next clerkship. One more result needs to be discussed: Why did students in the control group set more goals and request a tutor's opinion more often than the students in the experimental condition? An explanation can be that students who prepared the conference, had already set goals for themselves and had already thought about strong and

weak points and therefore did not ask the tutor for her opinion as much as in the control group. However, because of marginal effects of the intervention in most of the comparisons, we should be careful to conclude that the intervention had this impact on the students.

Looking at feedback perceptions, it can be said that students were positive about the feedback they received. Also here, a difference was found between the experimental and the control group that needs to be discussed. The control group considered the feedback as more activating (the impact it had on behaviour) compared to the experimental group. A possible explanation is that the experimental group had already set goals for future behaviour and therefore the tutor's feedback was not as activating for them as for the control group.

Looking at student perceptions of ideal interpersonal tutor behaviour, students ideally want a tutor who is characterized by cooperative behaviour (right part of the model). On the influence dimension, students prefer a slightly more dominant than submissive tutor, but the preference for cooperative behaviour on the proximity dimension is much higher. The actual tutor behaviour and the ideal tutor behaviour turned out to be very similar. Therefore, it is even more understandable that the students were positive about the feedback they received. An interesting difference in ideal tutor behaviour on the influence dimension was a preference of .30 in the experimental compared to .40 in the control group. This significant difference can indicate that students in the experimental group have started to see the importance of their own self-regulating role through the preparation task.

Concerning self-efficacy, the intervention itself did not lead to an increase in student self-efficacy. However, overall student self-efficacy did increase significantly during the clerkship. This is a positive message for medical education in Utrecht, because self-efficacy is positively correlated with achievement (Pintrich and De Groot, 1990). As found in other research, positive correlations (.42 and .53) between self-efficacy and SRL were also found in this study. This can also be a sign that self-regulation has been adequately measured by observation. This brings us to a last discussion point.

Methodically, this study has been interesting because of the use of observation data instead of self-report data to investigate SRL. Regarding the results of the study, this way of measuring SRL is promising. It gives researchers an opportunity to measure self-regulation without being dependent on student self-reports. In future research, this method can be used to investigate new ways to enhance SRL. These new interventions should be developed to enhance SRL in general, and student-indirect regulation in particular, because in this study it was investigated that this kind of regulation was minimal. Because of the safe character of the environment of an individual feedback conference, we still believe that this is the ideal place

for students to develop SRL. When educators expect SRL in the workplace environment, it should absolutely be supported in a feedback conference. For tutors, this means that they should prompt student self-regulation by using tutor indirect regulation as was done by the tutor in this study. In future research, it would be interesting to study the effects of monitoring student regulation during the conference. When tutors learn to directly anticipate on this (lacking) regulation, students can possibly develop better self-regulation.

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