Medical students' self-regulated learning in clinical contexts
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Chapter 1

General introduction
“The object of education is to prepare the young to educate themselves throughout their lives.”

- Robert Maynard Hutchins

Rationale for this thesis

Paradigm shifts have been happening in medical education in the last century or so, and in the past few decades these have been accelerating. One prime example is how the teacher-centered approach on education has slowly shifted towards a more student-centered approach to learning. A century ago, philosopher John Dewey started to advocate that educational processes should build on the interests and knowledge of students, on an individual level, through thinking and doing.\textsuperscript{1,2} He envisioned that teachers should be facilitators in the process of learning, rather than just a source of knowledge in the process of teaching. This call for educational change was adopted by many educators and slowly shifted the educational paradigm from teacher- to student-centered learning.\textsuperscript{3} A call for educational change also resulted in new approaches to education such as problem-based learning and competency-based learning.\textsuperscript{4} The paradigm shift towards a student-centered teaching approach is slowly progressing, with recent reflections on medical education still calling for a stronger student-centered approach, in which the curriculum is more flexible to cater to students’ individual needs.\textsuperscript{5} Student-centered educational paradigms rely on active learning and on learners taking responsibility for their own learning. In medical education, this student-centeredness has also made its way into clinical training. Guidelines stress the importance of tailored objectives for students learning in a clinical context.\textsuperscript{6} Naturally, this change also involves great consequences for learners’ and teachers’ daily practice.

Nowadays, (future) doctors are trained in hospitals, clinics, and community health centers, by a team of staff members instead of a single preceptor. Consequently, the master-apprentice relationship has disappeared. Parallel to the decline in the master-apprentice relationship, the rise of competency-based medical education and the subsequent call for more flexible education have resulted in students and junior physicians increasingly being hold responsible for their own learning process.\textsuperscript{7-9} To do this, future doctors need to have personal objectives, be able to monitor their progress, and use assessment and feedback to self-evaluate and take responsibility for their own development.\textsuperscript{10}
Being responsible for one’s learning is closely related to becoming an effective life-long learner because in life-long learning doctors also need to be able to monitor their performance, decide on areas for improvement, and set goals for themselves. Competencies that are important for life-long learning, such as reflecting, have been integrated in competency frameworks such as the CanMEDS, the ACGME core competencies, and Tomorrow’s Doctors in one way or another. Because doctors need to master the competencies necessary to control one’s own learning, these competencies should be taught, assessed and fostered in (under)graduate medical education.

Various theories have been used to describe how people may direct their own learning, including experiential learning theories, reflective learning theories, and life-long learning theories. Many of these theories are closely aligned to constructivism and topics discussed in adult learning. As learning in clinical contexts takes place in a context with many competing tasks and curricular requirements, learners need to take responsibility for their learning within these contexts in a way that works best for them. Self-regulated learning (SRL) theories focus on learning within a given task, in a certain context and its boundaries.

The self-regulated learning theoretical framework

The various processes of SRL have been theorized by scholars from different fields of research. This includes self-regulation theories from educational psychology, but also control theory from cybernetic engineering, self-efficacy theory from clinical psychology, and goal-setting, action regulation, and resource allocation theories originating from industrial and organizational psychology. As a result, SRL theories describe a broad variety of processes that are actively regulated by students in order to strive towards achieving personally set goals. A widely used definition of SRL overarching the different theories is that: “Self-regulated learning is the modulation of affective, cognitive, and behavioral processes throughout a learning experience to reach a desired level of achievement”. All SRL theories also entail that learning is an active process which originates from a goal, rather than from a task in self-directed learning theories, and from feedback in reflective learning theories.

Sitzmann and Ely performed a literature review and meta-analysis of SRL. They concluded that different theories on SRL describe processes that can be categorized as: regulatory agents (goal setting), regulatory mechanisms (planning, monitoring, metacognition, attention, learning strategies, persistence, time management, environmental structuring, help-seeking, motivation, emotion control, and effort) or regulatory appraisals (self-evaluation, attributions, and self-efficacy). They also noted
how SRL is a process that is context-dependent. The importance of context on SRL is emphasized further by Butler and Cartier, advocating that SRL processes are highly dependent on context and should be studied as such.\textsuperscript{17,28} An adaption of their model of how self-regulated learning is nested in multiple layers of context is depicted in figure 1.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{An adapted version of Butler and Cartier’s model of self-regulated learning, presented by Brydges and Butler.\textsuperscript{29}}
\end{figure}

Because of the importance of a context on SRL, it is important to define what context is. In this thesis, I use a constructivist theory on learning and define context to be: an occasional, relational property between objects and activities that arises from activity and which features are defined dynamically.\textsuperscript{30}
**Self-Regulated Learning in the context of medical education**

Previous studies from other fields have shown that both person and context influence SRL. Many personal attributes that affect SRL have been studied in other fields of research. These include a student’s skill in goal setting and the various regulatory mechanisms and regulatory appraisals, motivational believes and attitudes, affective reactions to a given task, personality, educational level, history and experiences, strengths, challenges, and interests. The effect of a classroom context on SRL has also been the focus of many studies. The context of preclinical medical education shows many similarities with other forms of “classroom” education. However, a major part of medical education happens within a clinical context. Clinical contexts are shaped by specific patterns in: the care for patients, physical settings, supervision from senior staff members, the curriculum in which learners are enrolled, and peers involved. Learning in a clinical context largely takes place by participating in activities regarding patient care.

The complexity of clinical contexts and their primary focus on patient care are likely to have a profound effect on SRL. In a clinical context, learners are expected to integrate their previously acquired knowledge and skills to become participating members in a clinical team and they are expected to self-regulate their learning. Learners have to do this by managing their time differently, by defining their role in a new context, by deciding what to do with the learning opportunities they recognize, and by deciding how to cope with a perceived lack of learning opportunities. To aid learners in doing so, it is very important to understand how a clinical context influences learners’ self-regulated learning. However, up to date very little research has been conducted to understand SRL in clinical contexts.

**Summary of main argument and research questions**

SRL is associated with positive professional and educational outcomes. Moreover, the competencies associated with SRL are similar to those important in lifelong learning. SRL is influenced by both person and context. Therefore, it is also important to study what interaction personal and contextual attributes have that in turn may influence SRL. Consequently, to understand SRL, both the effect of the individual and the context need to be studied. However, very little is known about how SRL is situated in a clinical context and how person and context interact to influence learners’ SRL.
Because SRL is important to teach, assess and foster, we need to understand how SRL happens in a clinical context to optimally support the development of SRL skills. More specifically, we need to know what SRL looks like when learning in an unpredictable, clinical context, what effect various contextual factors have on SRL processes in clinics, and how contextual factors and personal factors influence each other resulting in SRL. Pivotal in SRL is how activities and task requirements in a context are interpreted by an individual, because this shapes all further decisions in SRL.27,28 This makes SRL more difficult in new contexts, in which learners do not know yet what activities to engage in, and what is expected of them. 37 Subsequently learners do not know what could be effective learning strategies and they may not have developed sophisticated strategies to take advantage of a context’s opportunities and negate potential drawbacks of a context.29 Therefore, this thesis focuses on improving our understanding of SRL by undergraduate medical students in clinical contexts. Undergraduate medical students have just transitioned into learning in clinical contexts and are therefore likely to need support in self-regulating their learning.29 Therefore, the central research question in this thesis is:

*How do medical students self-regulate their learning in a clinical context?*

**Research paradigm**

The research paradigm one works in influences study designs and outcomes. This thesis was the result of a constructivist stance, which means I envision that reality is subjective, context-specific and that no ultimate truth exists. Each person constructs their own, often shared, reality through the interactions with others.54 To fully acknowledge the complex nature of the subject under study, I have mainly used qualitative methodologies to answer the research questions.

**Role of the researcher**

I believe reality is constructed between people. As the main researcher, I am likely to have had an influence on most of the outcomes of the research in this thesis. It is therefore important to understand my role and previous experiences prior to constructing this thesis, to put the results of this thesis in the right perspective.
Before constructing this thesis, I have been a medical student myself, at the Academic Medical Center-University of Amsterdam, from which I graduated in 2013. This prior experience has clearly been beneficial for my ability to imagine the situations students described when discussing their learning in interviews or during focus group sessions. It allowed me to understand the students’ specific vocabulary, discussions about the medical curricula, about the clerkships specifically, and about the Dutch higher education system in general. Furthermore, the small hierarchical and small age difference between most students and me, likely limited the barrier for students to discuss topics they felt might be sensitive to the faculty and, as I am also an MD, students appeared to trust me and often shared personal situations and problems that affected their learning.

However, having recent experience in clerkships myself also has a possible downside to the research project. My personal experiences with learning in the clinic may have had an influence, for instance on the research questions we studied, the population I selected for my research, the intonation used whilst asking questions, and the follow-up questions I pursued during interviews. It is inevitable that some of my own experiences have had an influence on the results of our studies. Together with the various research teams I worked in, we have tried to constantly be aware of this and reflect on the effect I may have had on the results presented, for instance by reading many transcripts together with other researchers.

The specific context of this thesis
In this thesis the role of context has a central place. Specifically interesting about the clinical context as a learning context, is that it is full of routines and habits on the individual staff member level and on the department level. These routines and habits influence the roles and tasks of students, and therefore also influence the interactions students have with other people during their clinical clerkships.

The studies presented in this thesis have been conducted in the Netherlands. All but half of the students who participated in chapter 4 were enrolled in the Master of medicine program at the Academic Medical Center-University of Amsterdam (AMC-UvA). In this section I give some details about this specific context. The students from another Dutch university, who participated in the study presented in chapter 4, were enrolled in the master of medicine program of Maastricht University. The details regarding their curriculum are given in chapter 4.
At the AMC-UvA, the study of medicine (MD program) has been split into a three-year bachelor of medicine program and a three-year master of medicine program. Each year a cohort of 350 students is enrolled in each program. In the bachelor of medicine program all 350 students start simultaneously at the start of the academic year. In the master of medicine program, every other week a group of 13 to 14 students is enrolled. Students are required to participate in 14 or 15 consecutive rotational clerkships, ranging from 3 to 10 weeks in duration, where almost every clerkship takes place in a different hospital or institution. The last 6 months of the master of medicine are allocated for pre-specialization and a research project. During clerkships, students are expected to participate in activities on wards, outpatient clinics, emergency rooms, delivery rooms, operating theatres, public health institutions and general practices, with increasing independence and responsibilities. Additionally, they are often required to attend some educational sessions and, for assessment purposes, they need to keep a portfolio.

**Overview of the studies**

In this thesis, I present four empirical studies on undergraduate medical students’ self-regulated learning in clinical contexts, followed by a general discussion.

**Chapter 2** reports a study that used focus groups to explore the importance of various social attributes on students’ SRL in a clinical context, by answering the question: *how do undergraduate medical students perceive routines of clinical departments to influence their self-regulated learning in clerkships?*

**Chapter 3** reports an interview study, aided by a visual technique, to explore the influence single people have on students’ SRL in a clinical context, by answering the question: *how do medical students perceive the influence of other people in clinical contexts on their self-regulated learning?*

**Chapter 4** reports an interview study, aided by The Day Reconstruction Method, to deepen our knowledge of how SRL works in a clinical context and the complex, intertwined role which personal, social and contextual attributes have in this process, by answering the question: *what are the factors that affect medical students’ self-regulated learning in the clinical workplace?*
Chapter 5 reports a Q-methodology study to find what behavior results from students’ SRL in a clinical context, by answering the question: *what patterns in students’ self-regulated learning behaviors in a clinical context can be identified, and what are their most important characteristics?*

Lastly I provide a general discussion in chapter 6 on the findings of the studies reported in this thesis. I will make suggestions for future research, I will discuss theoretical implications of the findings presented in this thesis, and I will discuss the practical implications of this thesis, because I feel research has most value if it results in implications for practice. Figure 2 gives a visual representation of the specific subjects studied in the various chapters, using Butler and Cartier’s model of self-regulated learning in context.

![Diagram](image)

*Figure 2. Overview of specific subjects studied in the various chapters using the model of self-regulated learning in context.*

This dissertation is based on journal articles, so some repetition of information across chapters cannot be prevented.
References

2. Dewey J. Education and experience; 1938.
12. ACGME. Outcome project: General competencies; 1999.


