Medical students' self-regulated learning in clinical contexts
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Chapter 3

How clinical medical students perceive others to influence their self-regulated learning

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Abstract

Objectives
Undergraduate medical students are prone to struggle with learning in clinical contexts. One of the reasons may be that they are expected to self-regulate their learning, which often turns out to be difficult. Students’ self-regulated learning is an interactive process between person and context, making a supportive context imperative. From a socio-cultural perspective, learning takes place in social practice, and therefore teachers and other hospital staff present are vital for students’ self-regulated learning in a given context. Therefore, in this study we were interested in how others in a clinical context influence clinical students’ self-regulated learning.

Methods
We conducted a qualitative study borrowing methods from grounded theory methodology, using semi-structured interviews facilitated by the visual Pictor technique. Fourteen medical students were purposively sampled based on age, gender, experience, and current clerkship to ensure maximum variety in the data. The interviews were transcribed verbatim and were, together with the Pictor charts, analyzed iteratively, using constant comparison and open, axial and interpretive coding.

Results
Others could influence students’ self-regulated learning through role clarification, goal setting, learning opportunities, self-reflection and coping with emotions. We found large differences in students’ self-regulated learning and their perceptions of the roles of peers, supervisors and other hospital staff. Novice students require others, mainly residents and peers, to actively help them to navigate and understand their new learning context. Experienced students who feel settled in a clinical context are less susceptible to the influence of others and are better capable of using others to their advantage.

Discussion
Undergraduate medical students’ self-regulated learning requires context-specific support. This is especially important for more novice students learning in a clinical context. Their learning is influenced most heavily by peers and residents. Supporting novice students’ self-regulated learning may be improved by better equipping residents and peers for this role.
Introduction

Students are prone to struggle with learning in clinical contexts, especially when transitioning from preclinical to clinical medical education. 1–3 Students may have a hard time understanding what they can expect and what is expected of them, resulting in high levels of uncertainty.4 In a clinical context which is not primarily designed for teaching and learning, students are no longer told what exactly to learn, and are expected to take control of their own learning.5 Being expected to engage in so-called self-regulated learning (SRL), poses a large challenge to undergraduate medical students.5

In SRL, an individual proactively modulates affective, cognitive and behavioral processes, to direct learning in order to achieve a desired level of competence.6 This includes goal setting, emotion control, environment structuring, gathering feedback and self-reflection.6,7 Many educators and researchers agree on SRL being beneficial for learning.8,9 Following Brydges and Butler’s situated model of SRL, SRL results from a complex process that happens in the interaction between an individual and the context in which learning takes place.9 Consequently, both individual and context influence the process and outcome of SRL.10 Therefore, SRL is known to be difficult in a hectic, ever changing context, such as a hospital.11

A broad variety of contextual factors, including historical, cultural, pedagogical, physical and social factors, have been described to influence students’ SRL.6,11–15 From a socio-cultural perspective, workplace based learning is a social process and consequently social factors are essential.16 Social factors that have been described to influence students’ SRL include other people in a workplace, students’ relationships with them, students’ familiarity with them, the feedback they give to students, the willingness of other people to create possibilities for students to engage in SRL and practice independently, these peoples’ experience and motivation for teaching, the engagement of students in the team and the social support students receive from the team.9,11,15 Previous research has focused on specific aspects of social factors influencing student learning in a clinic, such as how students use peers to compare their performance and build on others to develop an identity in a clinical context.17–19 However, to our knowledge there have not been any studies on how others influence the process of self-regulated learning in clinical contexts, including goal setting, various regulatory mechanisms and regulatory appraisals.6
In this study we were specifically interested in: who are the people in a clinical context affecting students’ SRL, how these people have an influence and to what extent. This knowledge is of importance because gaining a deep understanding of how other people in a clinical context can support or hinder students’ SRL can aid future attempts on improving contextual support for clinical students’ SRL. Therefore this study aims to answer the following research question: How do medical students perceive the influence of other people in clinical contexts on their self-regulated learning?

Because of our socio-cultural perspective on SRL in clinical contexts, it is important to study students’ SRL experiences holistically. Various tools for assessing self-regulation have been developed, ranging from measurement tools to microanalysis protocols. However, we explicitly wanted to focus on the influence of other people. Since it can be difficult for participants to bring to mind all people involved in a complex setting, therefore we chose to use a qualitative methodology consisting of semi-structured interviews, supported by a visual technique (the Pictor technique) to answer our research question.
Method

Design
We position ourselves in a constructivist paradigm, believing that reality is subjective, context-specific and that there is no ultimate truth. We carried out a qualitative study borrowing on methods from grounded theory methodology in order to do a systematic analysis of participants’ perspectives on relationships influential in their engagement in SRL, using purposive sampling and iteratively gathering and analyzing data until theoretical sufficiency was reached. We chose an individual approach for the data collection to create a safe environment in which students would feel free to elaborate on their personal experiences.

The research group consisted of researchers with varied experiences and backgrounds to enhance interpretation and understanding of our findings using multiple perspectives. The first author (JB) is a recently graduated MD and a PhD-candidate in health professions education. All other authors have PhD's in health professions education and have different backgrounds, including elderly care medicine (EH), obstetrics/gynecology (PT), psychology and psychometrics (CvdV) and veterinary medicine (AJ).

Setting
We recruited medical students from one large Dutch medical school with entering cohorts of 350 students per year. The medical curriculum includes a preclinical phase (year 1-3) and a clinical phase (year 4-6). The clinical phase consists of rotational clerkships ranging from 3 to 16 weeks. During these clerkships, medical students participate in a wide range of activities regarding patient care. All students are supported similarly, and are closely supervised. Students are usually supervised by residents when learning in wards, delivery rooms and emergency rooms, and consultants in outpatient clinics, operating theatres, public-health institutions, nursing homes and general practices. Both residents and consultants provide formative feedback using mini-CEX-like forms, but only consultants provide a final summative assessment at the end of a clerkship. Generally, three to ten students are enrolled in a clerkship simultaneously but they infrequently collaborate except when learning in the wards and during formal educational meetings.

Participants
To ensure a wide variety in experiences, the participants were purposively sampled regarding age, gender, experience, and current clerkship. We included students who were enrolled in different clerkships, and included students who were in different
years of the clerkships because students are expected to learn and act increasingly independent as they progress through the curriculum. Between July and October 2015, the first author (JB) approached students during educational meetings and sent invitations to participate through email. We included 14 students. Details of the participants are given in table 1. After the interview, participants were given a €10 gift certificate as compensation for their time.

<table>
<thead>
<tr>
<th>Fictional name</th>
<th>Gender</th>
<th>Age (in years)</th>
<th>Current clerkship</th>
<th>Experience</th>
</tr>
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<tbody>
<tr>
<td>Victoria</td>
<td>Female</td>
<td>22</td>
<td>Surgery</td>
<td>4\textsuperscript{th} year</td>
</tr>
<tr>
<td>David</td>
<td>Male</td>
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<td>4\textsuperscript{th} year</td>
</tr>
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</tr>
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<td>Marlon</td>
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<td>5\textsuperscript{th} year</td>
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<tr>
<td>Demi</td>
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<td>27</td>
<td>Obstetrics and Gynecology</td>
<td>5\textsuperscript{th} year</td>
</tr>
<tr>
<td>Jamie</td>
<td>Male</td>
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<td>Obstetrics and Gynecology</td>
<td>5\textsuperscript{th} year</td>
</tr>
<tr>
<td>Hayley</td>
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<td>Megan</td>
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<td>Tom</td>
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<td>Obstetrics and Gynecology</td>
<td>5\textsuperscript{th} year</td>
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<td>Maggie</td>
<td>Female</td>
<td>25</td>
<td>Pediatrics</td>
<td>6\textsuperscript{th} year</td>
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<tr>
<td>Anita</td>
<td>Female</td>
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<td>Internal medicine</td>
<td>5\textsuperscript{th} year</td>
</tr>
<tr>
<td>Laci</td>
<td>Female</td>
<td>25</td>
<td>Geriatrics</td>
<td>6\textsuperscript{th} year</td>
</tr>
<tr>
<td>Amy</td>
<td>Female</td>
<td>26</td>
<td>Plastic, Reconstructive and Aesthetic surgery</td>
<td>6\textsuperscript{th} year</td>
</tr>
<tr>
<td>Jennifer</td>
<td>Female</td>
<td>27</td>
<td>Obstetrics and Gynecology</td>
<td>6\textsuperscript{th} year</td>
</tr>
</tbody>
</table>

*Table 1. Characteristics participants*
Data collection

The first author conducted all the interviews. Because he has recently experienced the clerkships himself, he was able to relate to the students’ narratives and envision their experiences. This allowed for meaningful follow-up questions to enhance insight in the experience and questions regarding emotional reactions to the experience described. The first author’s experience in SRL research allowed for specific questions regarding constructs related to various SRL theories as described by Sitzmann and Ely. A possible adverse effect might have been that follow-up questions were too focused or colored by personal experiences. By continuously reminding himself of this, by frequently reading interview transcripts with other team members, and by iteratively gathering and analyzing data, we attempted to appropriately balance this.

After obtaining informed consent and some background information regarding demographics and medical interests, the interviewer briefly explained that self-regulated learning refers to directing one’s own learning through goal setting, planning, monitoring, reflecting on progress, and thinking about future learning. Next, he asked participants to construct a representation of roles and relationships of other people in a specific setting following the Pictor technique as originally described by King et al. Students were instructed to write all people or groups influencing their self-regulated learning on arrow shaped adhesive notes and to stick these notes to a large sheet of paper, creating a visual representation or story of how their SRL was influenced by the people depicted on the arrows. Participants were not limited in any way to portray their experiences. They were invited to include explanatory words, arrows or other visual tools and were allowed to change their Pictor chart throughout the interview. We used the visual representation as a prompt to help participants tell their stories not only through words but also visually. The interviews following the creation of the Pictor charts lasted for approximately one hour.

The interviews were audio-recorded and transcribed verbatim. We gave all students an alias. The first author performed a preliminary analysis after each interview and provided participants with a half page summary of the interview to enable a member check. Participants also received a picture of their charts and were asked if any supplemental changes were desired. Nine participants verified the summary of the interview, one of them recommended small changes and one supplied additional information that was not addressed during the interview. All of these eleven participants agreed with the Pictor chart. Three participants did not respond to the request.
Data analysis
After each interview, the first author (JB) open coded both the transcripts and the Pictor charts using constant comparison to review and match the data in the transcript and Pictor chart. The interview transcripts and Pictor charts were constantly inductively compared using open coding. Emerging concepts were used to guide following interviews of other participants. Open coding was followed by axial coding and interpretive analysis.

The first and second author (JB, EH) discussed the transcripts, Pictor charts and emerging concepts of the analysis biweekly during a period of four months. Additionally, we discussed the emerging ideas and interesting findings with the research group during the analysis and writing-up, six times in total. To keep track of our interpretations, the first author kept memos and a log to record all emerging ideas and concepts. We used the situated sociocultural theory of SRL by Brydges and Butler, and the constructs involved in SRL as reported in Sitzmann and Ely’s meta-analysis as sensitizing concepts supplementary to our analysis.6,9,26 Data analysis was supported by the use of MaxQDA V11 (Verbi GmbH, Berlin Germany).

Ethical considerations
The Ethical Review Board of the Netherlands Association for Medical Education (NVMO) approved the study under file number 535.

Results
Students described the role of other people in the workplace and their influence on their learning in many different ways. Arrows were arranged to represent negative or positive influences, their importance, power differences, barriers that were felt in relationships, amount of effort invested in relationships, flow of knowledge, or developments over time. Students used between 6 and 15 arrows to depict these issues in their Pictor charts.

People could influence students’ SRL through affecting role clarification, goal setting, learning opportunities, self-reflection and emotional coping. Many of the more experienced students expressed they perceived large changes in their perceptions of the roles of, and relationships with, others in the workplace as they progressed through the clerkships. We will illustrate our findings by focusing on two extreme situations: novice students at the start of clerkships and experienced students. However, it must be noted that variation existed between all participants. Not all of the more senior
students reported learning like an experienced student in a clinical context and some junior students explained their learning like an experienced student from the onset of clinical training. In the last section of the results, we will include a description of how experienced students explained their transition from learning as a novice to learning like a (more) experienced student. Table 2 summarizes our findings.

<table>
<thead>
<tr>
<th>Self-regulated learning pattern in clerkship</th>
<th>Novice student</th>
<th>Experienced student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others important for students’ SRL through:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role clarification</td>
<td>Very dependent on peers.</td>
<td>Know who they want to become, little need for support.</td>
</tr>
<tr>
<td>Goal setting</td>
<td>Reactive learning goals depend on questions from all others around and patient’ illnesses. Personal goals often derived from peers. External goals set by residents, consultants and the curriculum.</td>
<td>Reactive learning goals depend on questions of nursing staff and patient’ illnesses. Personal goals are communicated to supervisors. External goals set by residents.</td>
</tr>
<tr>
<td>Learning opportunities</td>
<td>Very dependent of residents. Peers, consultants, and nursing staff are also important</td>
<td>Dependent of residents and consultants. Peers also important.</td>
</tr>
<tr>
<td>Self-reflection</td>
<td>Dependent of nursing staff, peers, patients, residents and consultants.</td>
<td>Dependent of nursing staff, peers, residents, consultants.</td>
</tr>
<tr>
<td>Coping with emotions</td>
<td>Dependent on peers, family, friends.</td>
<td>Dependent on residents, peers, family, friends.</td>
</tr>
</tbody>
</table>

Table 2. Summary of how others in a clinical context influence novice and experienced undergraduate students learning in clerkships.
Novice students in clerkships

A novice student metaphorically can be characterized by a pinball being shot into a pinball machine. Students were launched into clerkships and they bounced back and forth in a clinical context without a clear trajectory, which is illustrated by the Pictor chart of Marlon (Figure 1). He portrayed how he perceived that knowledge usually flows from consultants, through residents to him. During this process, many people interacted with him and influenced his SRL, visualized by the bidirectional arrows. His Pictor chart illustrates how many novice students describe having close relationships with residents and with peers. The influence of others, such as patients, nurses, and consultants in a clinical context on novice students’ SRL was much smaller. We will therefore first focus on how residents and peers influenced novice students’ SRL and afterwards the influence consultants, nurses, and patients could have.

Figure 1. Marlon’s Pictor chart representing how others influence his SRL
Residents played a decisive role in novice students’ SRL because they are the people students spend most of their time with. Residents could facilitate aspects of SRL. Residents influenced novice students goal setting through helping students what goals they should be working on, stimulated reactive on-the-spot learning through the questions they asked, and played an important role in aiding self-reflection because they gave feedback to students and stimulated reflection by simple questions such as: “what did you learn today?”. Novice students explained to use residents’ behaviors and competencies as a standard of reference for self-assessment of their own competencies, indicating how a major goal of many novice students was to be able to function as a resident.

Peers were the other group of people who played an important role in many novice students’ SRL. Similar to residents, peers could also facilitate all aspects of SRL. When novice students faced uncertainty in their new role and were unclear of what is expected of them, they often asked more experienced peers to show them around. Besides a basic introduction, this gave them some idea of what realistic learning goals may be and the specific do’s and don’ts of the department. Students experienced a low barrier to ask peers for help, and peers could also trigger reactive on-the-spot learning by asking each other questions. Some high-functioning peers could even serve as role models. Lastly, peers played a similar role as residents in the self-reflection process of SRL by setting a standard of reference for self-assessment through social-comparison and by stimulating reflection through questions. Additionally to this, peers played a unique role in novice students’ SRL, because they could assist in coping with emotional reactions resulting from experiences in a clinical context. Sharing emotional experiences with their peers was experienced as an important source of social support. However, some students also reported peers hindering their SRL, because they experienced a feeling of competition.

*Jennifer*: “My first real clerkship was pediatrics, here [at the academic hospital] a peer showed me around a little,...but not really [...] Even though they are instructed to do so of course, they see you as competition. They think: if I make a better impression, I’ll get a higher grade [...] They really throw you into the deep end, and may enjoy not explaining things to you, because they then have the advantage over you of knowing how to do it”.

Novice students also referred to consultants, nurses and patients in their Pictor charts to influence their SRL, but to a lesser extent. Consultants could instruct novice students about the goals they could be working on, although novice students’
explained they rarely had contact with consultants. Besides goal setting, consultants and nurses played an important role in creating a safe learning environment, a positive atmosphere and engaging students in the team. This facilitated novice students SRL strategies because this permitted them to make mistakes, ask questions, create learning opportunities, and seek feedback. Novice students also learned by observing others such as consultants and nurses. This role model function is exemplified in the quote by Megan. Patients’ influence was limited to affecting learning opportunities because a patients’ problem determined the content of learning opportunities. Questions from patients and their families, similar to questions from consultants and nurses, could also initiate reactive on-the-spot learning.

Megan [about nurses]: “They won’t teach me how a disease works [...] but I think they can show you how to treat patients [...] You also look at the,.... at other students, well at everyone, also residents and consultants. Everyone treats patients differently, so you can decide for yourself what you believe is good and bad [...] Sometimes it is good to see something not go very well, to make you realize: this did not go well, and sometimes you think: yes, I would like to be able to do this”.

Experienced students in clerkships
If novice students can be characterized as pinballs in a pinball machine, experienced students can be thought of as snowballs rolling downhill. These students explained a clear trajectory in their learning, becoming more powerful whilst rolling, and that only significant obstacles could deviate them from their path. The Pictor chart of Laci (figure 2) illustrates this visually. The proximity of the arrows to herself portrays how important she perceived many others, such as physician assistants and nurses, to be beneficial to her SRL. Laci’s Pictor chart is also more structured then Marlon’s and symbolizes how she understood the clinical context and felt like a true member of the clinical team. She discussed having strategies to use all people in her Pictor chart to benefit her learning. Because of these strategies, the influence a single person had on her SRL in general was smaller than for novice students. Experienced students often had a clear objective of what kind of doctor they wanted to become. They did not need peers to help with goal setting, but were more dependent on the help of consultants to assist them in creating adequate learning opportunities. This is illustrated in Laci’s Pictor chart - compared to Marlon’s chart, as the distance between the arrow representing peers and her own is larger, while the arrows representing consultants are closer to her own and consultants of other specialties.
are also mentioned. We will discuss the roles of residents, peers, consultants, nurses, patients and others in the same order as for the novice students.

The role of residents is different for experienced students than for novice students, because experienced students started to regard residents as near-peers. This resulted in residents affecting all aspects of SRL, but not being decisive in the SRL of experienced students. Additionally residents may also support coping with emotional experiences and may create a feeling of social support. Experienced students were also more likely to share their personal goals with residents. This was because they realized the residents might be able to provide effective strategies to reach certain goals, as residents were likely to have recently been in a similar situation. In the interviews, students emphasized that it was important that residents provided
experienced students with the autonomy and responsibilities they require in order to support their SRL, instead of just directing what students had to do or learn.

*Josh:* “What often happens is that they [residents] manage all patients and tell you: please call this-and-that person, and you know you won’t learn much from doing so, you should think of calling those people yourself [...] in the beginning it might be useful learning how to arrange things, but at a certain point you should be expected to think of that”.

Similar to novice students, experienced students also frequently used peers for their SRL. Peers could influence all aspects of SRL, but their influence was smaller. Student-peers did not have a large influence on their goal setting and experienced students were able to cope with emotional experiences of a clinical context, therefore the need for emotional support was smaller. Peers do play an influential role in experienced students’ SRL, for instance by functioning as a frame of reference, as Jennifer explained.

*Jennifer:* [talking about peers] “In your final clerkship there are peers around you who do the same clerkship, at the same time, in another hospital. You can compare them to yourself. “What things did you do?”, “What are you allowed to do independently and what not?”, and then you compare yourself to that: “Which of those things would I like to do?”. So I think peers doing the same clerkships, at the same time, in another hospital, still have had an influence on my learning”.

The role of consultants in the learning of experienced students was much bigger than for novice students because they partially fulfill the role residents’ play in novice students’ SRL. Consultants had little influence on goal setting, but had a large impact on learning opportunities and strategies as consultants were regarded as experts who could grant students the most interesting and challenging learning opportunities. Together, consultants and residents had a major influence on experienced students’ possibilities for SRL. Most experienced students explained smaller dependency on the safety of the learning environment created by consultants, residents and peers. Since they knew what they wanted, they would ask for focused feedback when they felt they needed it, and explained that they cared more for learning than assessment. Experienced students explained that consultants, residents, peers and nurses with low motivation could hinder the amount of effort they put in, but that students themselves still had their own intrinsic motivation, goals and learning strategies.
to rely on. Especially important for many experienced students’ SRL was a feeling of autonomy, getting increasing responsibilities in line with their goals, and being surrounded by stimulating people.

*Maggie*: “*In my final clerkship it was the first time I told patients the diagnosis and treatment plan. Of course that’s pretty strange. It is a real part of..., but until the final clerkship you don’t do that yourself, discussing the diagnosis and treatment plan. You may take a history and physical examination, but then you return [to the consultant], explain your findings and discuss: “well what do you think it is and how should we proceed?” “Well” says the consultant, “I would do the same thing”, but then he ends up delivering the message [...] but really I think: “well, if you agree, let the student deliver the message”.*

The influence of others such as nurses and the people in charge of making the planning, on experienced students’ SRL in a clinical context is large in comparison to novice students. Experienced students felt more a part of a clinical team and knew how to involve others in their SRL strategies. Exemplary was how experienced students would share their goals with many others, including peers, consultants and nurses, using their knowledge to discuss which strategy to use to achieve their goals.

*Amy*: “*During my last clerkship, I discussed with one of the nurses whether an elective on the neonatal intensive care unit would be a smart move. Yes you talk about that [...] I find teamwork very important so maybe that is resembled in this.*

**Transitioning from novice into an experienced student**
Looking back on their clerkships, many of the experienced students explained how they had changed because they gradually realized they needed to take control of their learning. Taking control of one’s learning led to more focused learning goals, using more efficient learning strategies, and asking for feedback on achieving the competencies students felt they needed. There were multiple ways students described this process. Many experienced students explained this happened after 3-6 months in the clerkships.

At that point they started to realize what doctor they wanted to become and set learning goals accordingly. They felt more comfortable in a clinical context and
realized they could be of added value to a clinical team, instead of being a ‘nuisance’. Many students explained having effective strategies to cope with emotional clinical situations. They frequently involved many people in their learning by asking questions, asking for learning opportunities and feedback. They experienced less of a hierarchical barrier when talking to consultants and residents were no longer idolized, but often seen as more experienced near-peers. In the following quote, Josh explained how he realized his learning changed after receiving feedback of a resident.

Josh: “Residents say to you: yes, just imagine there is no supervisor [...] always assume there is no backup. Always think of a conclusion and treatment plan, because if you don’t...I thought that was very good advice actually. Of course you are not always right, but if you try this it will make the transition to residency easier [...] and you learn more I think. You just have to,... think of things yourself and then you realize what problems you might face”

Discussion

Our study provides insight in how other people influence undergraduate medical students’ SRL in a clinical context through affecting role clarification, goal setting, learning opportunities, self-reflection and emotional coping. Our findings provide insight in how others can have a large influence on students’ SRL through the formal curriculum, the informal curriculum, and perhaps even part of the hidden curriculum. The descriptions by students of the roles of these other people were indicative of different phases in how students engage in SRL as a novice and as an experienced student. As a novice, students’ social context is limited to the medical team they work with. As a result, novice students’ SRL often heavily relies on the support of residents and peers. It can be easily affected by anyone interacting with them, and therefore their SRL may often have the unpredictable trajectory of a pinball. In contrasts to novice students, experienced students appear to be able to enhance their understanding of a clinical context enabling them to better navigate the social context, and finding support to reach specific goals. Their SRL is further supported as these students get a grasp of learning in a clinical context, knowing what their role is, and knowing who they want to become. This results in their SRL following a clearer trajectory of a snowball rolling downhill.

How students perceive others to influence their SRL seems to result from interpreting culture, pedagogy and a social environment differently. Novice students are often
unable to navigate a clinical workplace culture because of a lack of understanding of their role in it. Novice students expect others to actively engage in their learning. Novice students themselves only actively involve people they have frequent interactions with in their SRL. Experienced students on the other hand tried to build relations with many people they worked with. They more actively tried to engage consultants in their learning and benefit from it.

Novice students reported their SRL to be hindered by a feeling of being of little added value or even being a nuisance to a clinical team. This feeling may be founded by their preclinical education and reflect how they are historically trained to learn, as a person’s SRL is influenced by history and experiences. Novice students had difficulty coping with this emotional stress because it made them feel unwanted. They explained this could decrease their motivation for SRL and required emotional support from peers to overcome these feelings. Emotional support by peers could be inhibited if there was a feeling of competition among students.

The transition from novice to experienced student appeared to rely on an adequate understanding of a clinical context. This closely relates to theories regarding communities of practice. This perspective strengthens the case for longer clinical placements, because longer exposure facilitates students’ understanding of a clinical community of practice, and consequently what a student’s role in a team might be.

**Strengths and limitations**

A strength of our study lies in the use of the Pictor technique. This technique allowed us to study the subject holistically using a constructivist paradigm. It also functioned well as a prompt for the semi-structured interview and made intangible barriers visible. Nonetheless, interviews and in fact all recall studies suffer to some degree from memory-bias, e.g. increasing the role of one’s own conscious will. Additionally, participants may have reported more consciously how others influenced their SRL, than they would have if they were unaware of the topic of this study.

Because the interviewer explained that he only has had a short postgraduate, non-medical, career to the students before the interview, there was little to no hierarchical barrier present, allowing for more disclosure. However, students’ experiences that were similar to experiences of the interviewer may have provoked more follow-up questions than experiences that did not feel familiar to the interviewer.
We believe our results are likely to be largely transferable within our Dutch educational context. However, as previously described, social relationships are highly dependent on culture, and national culture may influence medical curricula. It is therefore likely that our findings regarding the roles of others and their importance on students SRL would be different in other cultures.

Implications for practice and future research
The ways in which faculty and others in a clinical context can support undergraduate clinical students’ SRL are still largely under researched. However, our results do provide an insight in how social influences affect students’ SRL. Our findings hint for possible ways to support undergraduate students’ SRL in a clinical context.

First of all, our findings strengthen the believe that expecting novice students to fully self-regulate their learning in a new environment may be very difficult for many. Thus, novice may benefit from scaffolding active support by others. Our results also show novice students report rarely interacting with consultants. In this context, faculty development initiatives may therefore better be focused on residents to enable them to effectively support students’ SRL. The importance of residents and peers for students’ learning in a clinical context has been described before, regarding role modelling and social comparison. Our results emphasize this importance even more (especially for novice students) because students reported peers and residents have the largest impact on their goal setting, opportunities, SRL strategies and self-reflection. Perhaps most importantly, a student’s transition from a novice ‘pinball’ to an experienced ‘snowball’ and subsequent SRL in a clinical context appears to result from feeling comfortable in a clinical context and facilitates working towards personal goals. Therefore supporting students’ SRL in a clinical context could be improved by lengthening student placements in a clerkship, following principles of longitudinal integrated clerkships and early clinical encounters. This enables students to find their way in the culture of the community, including the vocabulary, reduce the stress of transitions, help novice students’ understand their role, and ultimately help students become part of the health care team.

We suggest future research should focus on gaining a better understanding of how students transition into clerkships and how they navigate clinical communities of practice of a clinical context, for instance using ethnographic methodologies. This could help us understand how students start to learn like an experienced student even further. A longitudinal study design could increase our understanding of this transition and may shed some light on how best to support the individual student
through the transition from novice to experienced student and how this can be supported by peers and residents, since they have most contact with novice’ students in a clinical context. Lastly, our findings about social influences on students’ SRL give an insight in how SRL is not only influenced by the formal curriculum, but also the informal and hidden. This topic has sparsely been addressed in previous research and requires a more thorough understanding.

Conclusion

The influence others in a clinical context have on undergraduate students’ SRL is different for novice and experienced students. The role of residents and peers is highly decisive for many novice students and the roles of others are more marginal. The role of residents and peers in experienced students’ SRL is also large, but other people such as consultants also play important roles. Students reported transitioning from novice to experienced learning behavior to be the result from feeling more confident of their role in a clinical context. Supporting the transition from novice to experienced student by helping students understand a clinical context and their role in it, is therefore likely to be beneficial for students’ engagement in SRL in a clinical context.
References


