Socially shared regulation in the workplace and the manifestation of the subphases

Researcher:	F.V. Roorda	f.v.roorda@student.utwente.nl
	s1134353	
Faculty:	Behavioural, Management and Social Sciences	
	Educational Science and Technology	
University:	University of Twente	
Supervisors:	MSc. M. Wijga	m.wijga@utwente.nl
	Dr. M.D. Endedijk	m.d.endedijk@utwente.nl
Date:	04-05-2017	

UNIVERSITY OF TWENTE.

Table of contents

Abstract

The performance of teams, the cornerstones of an organisation, can be enhanced by socially shared regulation. However, the definition of socially shared regulation and underlying subphases are broad and differ between studies. Also, most studies have been performed within a school context which differs from the workplace, mainly in that it is often less structured.. Thus the results from studies that took place within a school context may not apply in the workplace. The aim of this study is to clarify and sharpen the definition of socially shared regulation and underlying subphases within a workplace setting. Data was collected of three multidisciplinary and self-managing IT teams that work with an agile method. The results show that the teams spend most of their time planning and the least evaluating. Which can imply that teams within these settings can be helped with tools, that reduce time spend on planning and prompts for more evaluation regulation. It also shows that some subphases are context and objective dependent. With the results new definitions of the main phases of socially shared regulation have been developed. During the coding process a new coding scheme has been established that can be used in further research of socially shared regulation in the workplace. In addition scientific and practical implications and suggestions for further research are discussed.

Key words: Socially shared regulation, multi-disciplinary and self-managing teams, workplace, coding scheme

Acknowledgement

The past year was one with obstacles, challenges and with some little misfortunes. However, for the past year I've had the pleasure of learning new and interesting parts of a of educational science and technology research area, regulation. Through the enthusiasm of my supervisor Marijn on the area of socially shared regulation area, I became interested in this specific subject and how I could write my thesis about it. For me it was a relief that the collaboration between Marijn and me was one in which I could speak freely, was room for my thoughts and the pace in which I wanted to do my thesis. This provided me with room to make the subject my own, but also to have time for other passions of my such as rowing. I've learned about how to create a coding scheme, which is not as easy as I initially thought, how to code with a programme that I've never heard of before, and that new interesting techniques are being developed to even further analysis the sequence of (regulation) interaction between people. But most of all I've learned much about socially shared regulation. For the collaboration, discussions, information, ideas and of course the numerous feedback and e-mails I would like express my thanks to Marijn. You've enhanced my thesis in many ways and saw the potential in it even when it was hard to read. In addition, I would also like to thank my second supervisor Maaike, for helping to specify my research questions, focus of my study and feedback. I wish that I had more time for even more research about the manifestation of socially shared regulation and the influence of quality of regulation interaction and the possibility of the temporality of regulation. Hopefully can my thesis help in the further creation of knowledge, scientific and practical implication for socially shared regulation in the workplace.

Introduction

In today fast and changing work environment organisations are dependent on their human capital for their success (e.g. Florin, Lubatkin, & Schulze, 2003; Unger, Rauch, & Rosenbusch, 2011). Within organisations working in teams becomes increasingly more important and teams are considered the cornerstone of the organisation (Akkerman et al., 2007; Moe, Dingsøyr, & Dybå, 2010). Studies show that especially teams that are multidisciplinary and self-managing become more valuable for organisations because their performance is often better in comparison with traditional teams (e.g. Fong, 2003; Kauffeld, 2006; Van der Vegt & Bunderson, 2005). Information sharing is important within multidisciplinary and self-managing teams because of the different kind of backgrounds and knowledge of the different team members (Fong, 2003; Konradt, Schippers, Garbers, & Steenfatt, 2015; Van der Vegt & Bunderson, 2005). In addition, these teams deal with creating a common frame of reference, coming to a joint understanding, resolving discrepancies in understanding, make use and share their knowledge in the correct manner (Barron, 2009; Konradt et al., 2015; Van der Vegt & Bunderson, 2005). Socially shared regulation, the process in which team members regulate each other's metacognitive processes, can be here of help (Volet, Vauras, & Salonen, 2009). With regulation the transfer of knowledge can be enhanced, understanding of the content and the collaboration between the team members is also higher (Rogat & Linnenbrink-Garcia, 2011; Volet, Summers, & Thurman, 2009). However, studies of socially shared regulation often have been carried out within in a school setting. According to Tynjälä (2008), the work context differs from a school context in several aspects, but mainly in that it is less structured. The usage of regulation could therefore be different for a team of students that work collaborative on a structured task than a team of employees who work on an unstructured task, due to the differences between settings. It might be the case that teams at the workplace need different kind of prompts or guidance to improve the way they regulate their work. To support teams in their regulation in a work context it is, therefore, important to capture the manifestation of socially shared regulation in this particular setting.

Regulation is generally defined as a goal directed process in which different phases alternate, namely planning the tasks, monitoring the progress and evaluating the end product (e.g. Duffy et al., 2014; Janssen, Erkens, Kirschner, & Kanselaar, 2012; Khosa, 2014). The phases of regulation are broad in their definition and different studies use different definitions of which underlying categories or subphases are included in each phase (Panadero & Järvelä, 2015; Schoor, Narciss, & Körndke, 2015). This conceptual unclarity requires further investigation in order to shed light on how to define and theoretically integrate the concept of socially shared regulation, it's phases and subphases.

In addition, because regulation is a goal directed process, it can be expected that the usage of regulation can differ between settings where the goal differs. For example, the usage of regulation can be different in a meeting where the focus lies on the time line of a project than a meeting where the teams checks their process of the project (e.g. Iiskala, Vauras, Lehtinen, & Salonen, 2011; Schoor, et

al., 2015; Volet, Vauras, et al., 2009). Therefore, considering the objective with which teams meet and collaborate might broaden the understanding of how socially shared regulation manifests itself in a workplace context.

Regulation can be a powerful concept in helping teams to enhance their performance. But the definitions are broad and scholars differ in their use and meaning of the definitions. Also, studies of socially shared regulation have been mainly performed within a school setting, and further investigation of the essence and the bearing of this concept within the specific context of the workplace is needed. The aim of this study is to clarify and sharpen the operationalisation of socially shared regulation in a workplace setting. To do this, the focus lies on which and to what extent the subphases of socially shared regulation occur and whether this differs between meetings with different objectives. In addition, this study will also extent the existing knowledge and literature of socially shared regulation. The research will take place within an ICT company that uses an agile work method, the teams work in self-managing and multidisciplinary teams and is located in the Netherlands.

Theoretical framework

Teams

Self-managing and multidisciplinary teams are an asset for an organisation because they often outperform traditional teams (Fong, 2003; Kauffeld, 2006; Van der Vegt & Bunderson, 2005). This lies in the composition of various knowledge and skills, which creates unique knowledge and cross function linkages and in the sense of ownership through which the team members are more intrinsically motivated (Alper, Tjosvold, & Law, 1998; Fong 2003). However, these teams also encounter the difficulty of different reference frames and the transition of knowledge between different disciplines (Barron, 2009). With good quality socially shared regulation, the collaboration within a team but also the content knowledge and transfer of this knowledge can be enhanced (Akkerman et al., 2007; Margaryan, Littlejohn, & Milligan, 2012; Rogat & Linnenbrink-Garcia, 2011; Volet, Summers, et al., 2009). Didonato (2013) and Rogat and Linnenbrink-Garcia (2011) take it even a step further and state that shared regulation is crucial for a team's success in their studies. Also, the studies about the usage of regulation have had mainly a focus on the individual, while an individual approach within a social setting, such as a team, will not fully grasp the team dynamic and work (Volet, Vauras, et al., 2009). The last decade team-work has become more central in organisations and research to improve and understanding team performance has grown exponentially. But studies have been diverse with different kind of theoretical foundation and intended application. These various studies show vibrant results, but they are also diffuse therefore making it challenging to practically implement the outcomes (Baard, Rench, & Kozlowski 2014; DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004; Fong 2003). Several aspects could aid teams in their performance, but without a clear understanding how these processes could help to enhance the performance it is difficult to help these teams. The current study is

therefore aimed on self-managing and multidisciplinary teams, with the results further steps could be taken in how socially shared regulation can aid the performance of these teams within the workplace.

Besides the different compositions of a team, organisations can work with an agile, or traditional focused work method. Agile methods follow the main phases of traditional methods, but then in short iterative cycles (Rising & Janoff, 2000; Schwaber, 1997). Through these iterative cycles, teams can rapidly change, adjust and develop products or processes, which resembles the work method of multidisciplinary and self-managing teams. With an agile method flexibility and creativity and even knowledge transfer is possible and stimulated throughout the project due to the teamwork and many iterations (Rising & Janoff, 2000; Schwaber, 1997). An example of an agile method is scrum; with scrum teams work with a planning, preform their tasks and evaluate this (Rising & Janoff, 2000). With scrum a product is developed in different short development periods called *sprints.* Each sprint delivers a visible and usable part for the end product. During these sprints the team hold frequent meetings where every team member is up to date about the progress, therefore the work of every team member is also visible for every other team member (Rising & Janoff, 2000). These teams have high authority and responsibilities that are assigned to the different team members, aspects as planning, scheduling and making decisions (Moe et al., 2010; Rising & Janoff, 2000). Sprints begin with a planning, during the sprint there is the monitoring of the progress and at the end of the sprint the evaluation about the product, working method and processes. Teams discuss what went well and what needs to be improved for the following sprint. This order resembles the alternation of the phases of regulation. Thus, multidisciplinary and self-managing teams that work with an agile method have high authority, responsibility and the freedom to create their own planning, they need to monitor their own progress and evaluate every few weeks. In addition, this focus aids in the study of team performance and with the results of this study further steps can be taken in the enhancement of this. Therefore, is it interesting to study socially shared regulation within this context.

Regulation

Regulation can occur at the self, co and shared level and is a goal directed process (e.g., Khosa, 2014; Pintrich, 2000; Schoor et al., 2015; Volet, Vauras, et al., 2009). This means that regulation occurs in relation to some goal, or standard where the performance can be monitored against and that the specific use of regulation can be dependable of the goal of regulation (Khosa, 2014; Pintrich, 2000; Volet, Vauras, et al., 2009). As stated in the introduction, this goal directed aspect of regulation can influence to what extent regulation will occur in different meetings. Thus, that the usage of regulation is different in a meeting that is aimed at the monitoring of the process than a meeting that is aimed at planning the project. Therefore, can it be of importance to consider the objective with which teams collaborate and meet, because it can broaden the understanding of how socially shared regulation manifest in the workplace.

Regulation can thus occur at three levels, first self-regulation refers to the process that the individual uses to plan, enact and sustain their courses of action to achieve goals. Hereby the individual can be influenced by self and other social factors, such as peers and teachers (Hadwin & Oshige, 2011; Volet, Vauras, et al., 2009). Second, co-regulation refers to the process that a more experienced individual, a teacher, parent, or student, regulates the regulation of the less experienced individual (e.g. Hadwin & Oshige, 2011). At last, regulation within a group setting is referred to as socially shared regulation (e.g. Hadwin & Oshige, 2011). Socially shared regulation refers to the process that multiple persons' plan, enact and sustain their courses of action to achieve goals. The goals, standards, cognition and a common reference are co-constructed (Hadwin & Oshige, 2011). With socially shared regulation not only the self is regulated, but the whole process of the group as a whole is regulated. In this study, the focus is on the level of socially shared regulation as this is the most suitable to describe regulation processes occurring in a team context.

Often, regulation is described as a process in which different phases alternate in a time ordered sequence, these phases are planning, monitoring and evaluation (e.g. Duffy et al., 2014; Janssen et al., 2012; Khosa, 2014). Planning consists of activities that are focused on planning of an activity or task, but also how to solve a certain problem or which strategy to use for a task (e.g. Azevedo et al., 2004; DiDonato, 2013; Duffy et al., 2014; Janssen et al., 2012; Rogat & Linnenbrink-Garcia, 2011). Monitoring includes the clarification of plans or tasks, providing feedback, asking for help, questioning team members, determine what already has been to done and what needs to be done, and the monitoring of the remaining time and pace (e.g. Azevedo et al., 2004; Duffy et al., 2014; Janssen et al., 2012; Rogat & Linnenbrink-Garcia, 2011). At last, evaluation consists of judging the effectivity, efficiency, quality of the processes or co-worker (e.g. Duffy et al., 2014; Janssen et al., 2012). The definitions of these phases are broad and cover a wide array of different processes (Schoor et al., 2015). Therefore, it might be interesting to look at the underlying processes to shed more light on these phases. Literature shows that several studies already have sub divided the phases of regulation into subphases (e.g., Azevedo et al., 2004; Duffy et al., 2014; Rogat & Linnenbrink-Garcia, 2011). Planning has for example the subphases *time planning* and *prior knowledge activation*. The subphase *time planning* refers to the process where team members discuss which tasks need to be finished and in which order the tasks need to be executed (Azevedo et al., 2004; Hadwin, Wozney, & Pontin, 2005). Whereas the subphase *prior knowledge activation* refers to the process where a team member already preformed a certain kind of task and therefore knows the difficulty or time that the task will cost (Azevedo et al., 2004). Monitoring has for example the subphase monitoring *progress towards goals* or *partner questioning*. *Monitoring progress towards* goals refers to the process where the team discusses how much time they need to finish a certain task or what task still need to be performed (DiDonato, 2013; Duffy et al., 2014; Rogat & Linnenbrink-Garcia, 2011). *Partner questioning* refers to the process where team members question each other knowledge or understanding of a certain task or information (Azevedo et al., 2004; Duffy et al., 2014). Evaluation has the subphases *appraising of product* or the *effectiveness of one's approach*

for example. The *appraising of product* refers to the process where the product is judged in a positive way (DiDonato, 2013; Duffy et al., 2014). The subphase *effectiveness of one's approach* refers to the process were the team or team member is judged on how effective the approach was to a certain task or process (Duffy et al., 2014). These examples show that the main phases include a wide array of subphases and that the different studies use various subphases.

In addition, within the discussion or conclusion section, there are no details mentioned in the above-mentioned studies about the findings of these subphases. The argument for using subphases in the analysis phase is that by using more detailed subphases, the overarching phases are more easily captured (Azevedo et al., 2004). However, this detailed information is lost at the level of conclusions and results, as they only refer to the overarching phases. It is argued that using the subphases of regulation more than only for the coding process and making statements about the usage of these subphases in the result and conclusions section it could provide more insight about the main phases and socially shared regulation as a whole. Therefore, is there a need to further investigate socially shared regulation because it can shed light on how the phases and subphases can be defined and theoretically integrated. Thus, in the current study, the focus lies on which subphases manifest in the workplace, to what extent and if the objective of the regulation is of influence on the manifestation of these subphases.

School versus workplace context

Studies about regulation have been mostly preformed within a school context (e.g. Grau & Whitebread, 2012; Hurme & Järvelä, 2005; Molenaar, 2011; Volet, Summers, et al., 2009). The work and school context differ from each other in several aspects (Tynjälä, 2008). The two major differences are, that within a school context more structure is provided, a teacher is there to explain and to provide guidance, which is not present at the workplace. And in a work context there is more integration of the different disciplines, especially in companies that work with multidisciplinary teams (Tynjälä, 2008). Whereas in a school context, students mostly work with students of the same age, educational level and background (Tynjälä, 2008). With the integrating of different disciplines, regulation can help the transfer of knowledge, but also the content understanding and the collaboration within the team (Rogat & Linnenbrink-Garcia, 2011; Volet, Summers, et al., 2009). As stated in the previous section, the effectiveness of teams largely depends on this shared understanding of the problems they face and that this enhances the team performance. But there is still a lot to discover due to the broad research in this area with diffuse results (Baard et al., 2014; DeShon et al., 2004; Margaryan et al., 2012; Van den Bossche, Gijselaers, Segers, Wolter, & Kirschner, 2011). Extensive research has thus been done in the area of (socially shared) regulation in a school context. Because of the differences between a school and work context it could be that different subphases of regulation manifest when a team of students work collaborative on a structured task then when a team of employees work collaborative on a unstructured task. If different processes manifest within a work context, then different kind of prompts and support

is needed to improve the regulation of a team, that could improve their team performance. Therefore, is it interesting and vital to study the manifestation of socially shared regulation within a workplace setting.

The current study

Given the paucity in this area aim this study to take an explorative step and sharpen the definition of socially shared regulation through studying the manifestation of the subphases of socially shared regulation within a workplace setting. The study will be conducted with three teams from an organisation that develops ICT related products for the government, that work with an agile method, called scrum. This organisation works with a scrum method where a sprint usually last no more than three weeks. The different meetings in a sprint are the *planning, daily scrum, refinement, retro* and *review*. With the *planning* the team and product owner discuss on what needs to be completed at the end of the sprint and in which priority the tasks need to be completed, in some cases the team also discusses how much time a task will cost them. The *daily scrum*, also called a stand-up is a short meeting of maximum 15 minutes, where every team member updates the team about what he/she has done the day before, what he/she is going to do that day and if there are any problems. A *refinement* is usually held once or twice within a sprint for the following sprint, in this meeting the team and product owner improve, clarify and prioritize the different tasks. Sometimes they also estimate how much time it will cost them to execute the task. The *sprint retrospective*, also called retro is a meeting that takes place at the end of the sprint where the team and sometimes the product owner (which is not common according to the guidelines of scrum) look back at the sprint on what went well, what the team wants to continue next sprint and what needs to be improved the next sprint. This reflection can be about the work process, the quality of the work delivered, but also the collaboration between the team members or with the product owner/client. The last kind of meeting is the *review*, the goal of this meeting is to improve the collaboration between the team and client and to gather feedback. During this meeting, the sprint is evaluated in means of, if the goals are achieved and what needs to be done to improve the next sprint and if certain tasks need be adjusted. (“Scrum begrippen,” n.d.). The objective of every meeting is thus different and therefore can it be expected that the manifestation of regulation is also different between these meetings. Taken this aspect into account, could broaden the understanding of socially shared regulation within a workplace setting.

With the literature discussed in the introduction, theoretical framework and information provided in the current study, the following research questions were created (1) Which and to what extent manifest subphases of socially shared regulation at the workplace? (2) To what extent differs the manifestation of the (sub) phases between different kind of meetings?

Through the results that these questions will provide it is aimed to study which subphases manifest within the workplace and to what extent. With these results, it is aimed to clarify and sharpen the definition of socially shared regulation and aids in to the existing literature and knowledge.

Given the paucity of research that has been done in the area of socially shared regulation within a workplace setting, and the specific focus on the subphases of regulation, it is difficult to state a hypothesis. In addition, the studies about regulation often do not describe the usage of the subphases within their results. Therefore, no hypothesis is stated for the first question.

With the second research question, it is expected that the use of regulation will be different between the meetings due to the different objectives of the meetings. It is expected that during the planning and refinements the regulation phase planning will be most profound, because the team discusses the different tasks, whom the tasks will execute, and in which order, this kind of aspects are regarded as planning activities. During the retro, it is expected that the phase evaluation will be most evident, due to that the objective of the retro is the evaluation of the sprint and team. But it is expected that planning regulation activities also will be evident for a large part because when there is actively sought for a solution it is regarded as planning. With the stand-up, it is expected that the phases planning and monitoring will be most present. Because, during the stand-up the team members update each other and monitoring their progress and state what they have planned for that day to do. At last it is expected that during the review, evaluation is the most evident of the regulation phases due the evaluation of the task of the sprint.

Method

Participants

Participants were 14 employees (1 woman and 13 men). Employees worked on average 8.2 months within the team (SD = 5.38, range from -1 months till 16 months, one employee started within a team when recording of data was already started). The average age was 39.3 (SD = 6.75, range from 32 till 60). 43% of the respondents had higher education, 57% higher vocational education. Team 1 consisted of four employees, team 2 of five employees and team 3 also of five employees. All the teams of the organisation were contacted if they would participate in the current study. Teams could participate on voluntary basis.

Procedure

The study was presented with a presentation to the teams that were interested in participating in the study. During this presentation, the following aspects were explained, the goal of the study, the time investment from the team members, the method of data collection and the privacy monitoring. During this presentation, the team members could ask questions regarding the study. After the presentation, the team members could individually decide if they wanted to participate. Only if all the team members individually agreed to participate in the study the team would start the pilot. In a pilot of two weeks the team members could get used to the camera and data collection method. The pilot showed that the camera was not disturbing for the team during the meetings. After this pilot, team members had again the chance to withdraw from the study. Participating team members signed an informed consent form.

After this, the study started officially. Team meetings were recorded with a 360degree video-camera. The teams were asked to record their own meetings; therefore, all the team members got an instruction on how to use the camera. The teams received a feedback rapport after the data collection. For the monitoring of the privacy, the team members got individual feedback on individual level. The team got feedback on team level without naming specific team members. The organisation got feedback without naming specific team or team members.

Not all the recorded meetings were analysed due to the large amount of material. Of the recorded meetings, a total of 63 meetings were coded with 1800 minutes of material. For an even distribution between the teams and different kinds of meetings the following criteria were used. For team 2 and 3 four sprints were recorded, due the leave of a team member in team 1 only three sprints could be used for the coding. It was decided to code 3 stand-ups for each sprint of each team, for a reflection of the sprint. Therefore, seven stand-ups where not used for the analysis. It was decided to code all the meetings of two sprints for each team, because not every sprint had the same amount and kind of meeting. Sprints were chosen based on the variety of meetings. However, team 1 only had one sprint with a variety of meetings in the other two sprints only had one retro besides the stand-ups. Therefore, was it decided the code the retros from both sprint and code an extra retro of team 2 and 3. During the coding process it was decided not the use the review meetings due to the presence of multiple stakeholders during these meetings and the extent content talk. An overview of the meetings used for the analysis per team can be found in table 1. The difference in the number of meetings coded between the teams was not regarded as a problem because the focus of the study did not lie on difference between teams.

Table 1. Overview of meetings by team

Meetings	Team 1	Team 2	Team 3	Total
Stand-up	9	12	12	33
Planning	1	2	2	5
Refinement	1	4	2	7
Retro	3	3	2	8
Total	14	21	18	53

Coding scheme

The coding scheme was based on several studies (Azevedo et al., 2004; DiDonato, 2013; Duffy et al., 2014; Grau & Whitebread, 2012; Hadwin et al., 2005; Rogat & Linnenbrink-Garcia, 2011). The meetings were coded in the software program Observer XT version 13.0, this program allows a direct coding of the video data, with time-logged codes and sub codes. During the coding of the videos, a team of researchers constantly compared their results and discussed the codes until agreement was reached.

First, the steps that were taken during the coding process will be shortly described. After all the coding steps are presented, the establishment of the codes will be presented by coding step. Several

codes have been adjusted, removed or added during their process of analysing the data to fit the context of this study. A visual representation of the process can be found in appendix 1.

Coding procedure. The first step in the coding procedure was the distinction between regulation and non-regulation utterances. A regulation utterance was given a code of one of the main phases of regulation (planning, monitoring or evaluation). A non-regulation utterance was given the code, cognition, social talk or off-topic. The second step was that each regulation utterance was given a subphase of the corresponding main phase.

Regulation and non-regulation codes

The codes for non-regulation were cognition, social talk and off-topic. When the utterance was only about the content of the task it was coded with cognition, for example, for that task "I will use the backlog of the server". Utterances were coded with social talk when the utterance was socially oriented, a short joke or update about their family for example, "my phone flew through the room last night". Off-topic was used when the communication was too hard to understand or when it was still in line with the discussion but not content or regulation related, for example the question how something was spelled. Goal directed utterances that facilitated a shared conceptual understanding and task work on meta level were regarded as regulation, for example, "could you do this task?" or "we did not accomplish the sprint goal because there was an overload of tasks".

Subphases of regulation

Based on an extensive literature search subphases of regulation were identified, only the subphases that were relevant for this study are mentioned (Azevedo et al., 2004; DiDonato, 2013; Duffy et al., 2014; Grau & Whitebread, 2012; Hadwin, Wozney, & Pontin, 2005; Rogat & Linnenbrink-Garcia, 2011). In each main phase section the subphases are described and their definition. The initial coding scheme can be found in table 2 with definitions of each phase. In the results section the final coding scheme will be discussed and which subphases were altered, removed or added during the coding process.

Planning. The initial subphases were *time planning*, based on several studies referring to situations in which tasks are planned, the time planning is discussed and were the team makes a plan for handling certain tasks (Azevedo et al., 2004; DiDonato, 2013; Duffy et al., 2014; Grau & Whitebread, 2012; Hadwin, Wozney, & Pontin, 2005; Rogat & Linnenbrink-Garcia, 2011). *Allocation of tasks* was based on Azevedo et al. (2004), Duffy et al. (2014), Grau and Whitebread (2012), Hadwin, Wozney, and Pontin (2005) and Rogat and Linnenbrink-Garcia (2011) referring to situations were specific goals and tasks are set and divided. *Prior knowledge activation* was based on Azevedo et al. (2004) referring to situations in which team members relate to the current task or discussion with knowledge from a previous task or discussion. *Solving problems and discussing strategies* was based Duffy et al. (2014)

and Rogat and Linnenbrink-Garcia (2011) referring to situations in which problemes are solved and the best strategy for handeling a certain task were discussed.

Monitoring. The initial subphases were *team member questioning* based on Azevedo et al. (2004), Duffy et al. (2014) and Rogat and Linnenbrink-Garcia (2011) which refers to situations when a team member questions another team member about their understanding of the task or for information about handeling a task, the answering of those questions and the direction of the focus at the meeting of a specific teammember. *Monitor progress towards goals* was based Azvedo et al., (2004), Didonato (2013), Duffy et al. (2014), Grau and Whitebread (2012) and Rogat and Linnenbrink-Garcia (2011) and refers to situations where the team checks how far along they are with a certain task, or a team members gives an update about the progress. *What needs to be done* was based on Rogat and Linnenbrink-Garcia (2011) and refers to the situation where the team monitors what is left to do. *Providing feedback* was based on Duffy et al. (2014) and refers to situations where a team members gives feedback to the team or team member. *Help seeking behavior* based on Azevedo et al. (2004) and Duffy et al. (2014) refers to situations where a team member asks for help from the team or a specific team member.

Evaluation. The initial subphases were the evaluation of the *product* based on Didonato (2013) and Duffy et al. (2014) which refers to situations where a value judgement is made about the product or part of it. *Process of effectives* and the *process of efficiency* both based on Duffy et al. (2014) which refers to situations where a team member or the team judged the effectivity of the process, for example if the goal was accomplished from that sprint, or the efficiency, for example if better resource could have been used. Effectivity refers to achieving the goal and efficiency to the best way to achieve the goal, with the least resources possible. With scrum, there are two meetings where evaluation is central and team members give feedback on each other and their work. Therefore, the subphases *co-worker* and *work method* were created before the coding process. The subphase *co-worker* was used when a team member or team made a value judgment about a team member skill, attitude or work for example. The subphase *work method* refers to situations where a team member or the team made a value judgment about the work method of the last sprint, what and why it need to be improved or was better than the previous sprint/project. With the coding scheme presented in table 5 the coding process was started.

Table 2. Initial coding scheme with subphases and their definition

Subphases	Definition
Planning	
Time Planning	Planning of tasks, discussing time planning and efficiently agreed to a clear plan.
Prior knowledge activation	Activation of prior knowledge or tasks.
Allocation of tasks	Setting and dividing specific goals/tasks.
Solving problems and discussing strategies	How to go about solving problems or tasks difficulties and discussing which strategies to use.

Monitoring	
Monitor progress towards goals	Checking or giving an update about the progress on the project or task.
What needs to be done	Monitoring the time and pace remaining and what needs to be done.
Team member questing	Direction of the focus at the meeting, if the co-worker understands the task.
Providing feedback	Giving feedback on the team or team member.
Help seeking behaviour	Asking for help from the team or another team member.
Evaluation	
Effectives process	Evaluation about the effectivity of the process, how resources are used during the print/project.
Efficiency process	Evaluation about the efficiency of the process, if the goal of the sprint/project is reached and reason why or why not.
Work method	Evaluation about the work method, what and why it needed to be improved or was better than previous sprint/project.
Co-worker	Review on team members' skill, attitude or work.
Product	Judgement about the product or part of it, with argumentation.

Results

The following data was used for answering the research questions, the frequencies, relative frequencies and total duration of the subphases. For the first research question, which subphases manifested will be discussed first then to what extent these subphases occurred in the workplace. For the second question the frequencies of the subphases per meeting will be deliberated on. The reason for using the frequencies of the subphases was that it was useful to know how often a certain subphase occurred in comparison to the other subphases in the same main phase. The relative percentages of the occurrence of the subphases were used to compare the subphases within a main phase. The frequencies of the subphases within the meetings were converted to percentages of occurrence by meeting because not an equal amount of time was coded of every meeting. In this way, a comparison could be made of the same subphase between the different kinds of meetings. In addition, the total duration of the subphases was used, because it could reveal additional information. For example, subphases could have occurred in the same amount but could differ in the duration and vice versa. To answer the research questions in a structured manner the results will be presented by regulation main phase.

Subphases of socially shared regulation within the workplace

During the coding process, several codes have been adjusted, removed or added in order to suit the specific workplace setting. This resulted in the final coding scheme, which is presented in table 6. By every main phase the adjusted, removed and added subphases will be discussed.

Planning. The initial subphases were *time planning, solving problems and discussing strategies allocation of tasks* and *prior knowledge activation* (see table 3). The subphases *solving problems and discussing strategies* was divided during the coding process into the subphase *discussing strategies* and the subphase *solving problems*. The reason for this division was that when a certain strategy was discussed, there was not always a problem to be solved and it was solely a discussion about the best strategy to handle a certain task. While with solving problems there was always a discussion about the best solution and thus the best strategy. In addition, there was often a discussion without an obviously stated problem that had to be solved. The initial and final subphases of planning can be found in table 3.

Table 3. Initial and final subphases of planning

Initial	Final
- Time planning	- Time Planning
- Solving problems and discussing strategies	- Discussing strategies
- Allocation of task	- Solving problems
- Prior knowledge activation	- Allocation of task
	- Prior knowledge activation

During the coding process the difference between *time planning* and *allocation of task* were in certain utterances difficult, because team members stated that they were going to do a task within a certain time limit. The planning of when the task would be finished is part of the definition of *time planning* whereas the division of task is part of *allocation of task.* The difference between these subphases was defined as, when there was a set time for when a task was finished it was coded as planning. For example, “I hope that I finish that today” or “that has to be done in this sprint”. When team members explicitly said, they would do the task, or told the team what they were going to do that day it was defined as *allocation of task*.

In addition, during the coding process the teams sometimes complained only about the problem instead of solving the problem. The complaining about the problem was regarded as non-regulation and only when the team sought a solution for the problem it was codded as regulation. For example, “the client does not know what they want and it is really annoying they keep changing their needs” was regarded as non-regulation, whereas “I think we have two options, one we go on the way we did, or two we address this question with the client and see if there is something we can do together about it” was coded with the subphase *solving problems.* The final subphases with their definitions and examples can be found in table 4.

Table 4. Final coding scheme with definitions and examples of planning

Subphases	Definition

Time Planning	Planning of tasks, discussing time planning, efficiently agree to a clear plan or discussing of chancing the plan and stating when a task will be done and finished. *Than we have to include that in the next sprint* *First we have to that and then this.*
Discussing strategies	Discussing strategies on how to perform certain tasks. *A: For that status everything substantive must be done properly.* *B: Perhaps we can take it as one big story?* *A: If there is room for one more than we add the one at the top?*
Solving problems	How to tackle certain problems or tasks difficulties. *A:* Where *lies the problem do you think (…) or (...)?* *B: Perhaps it even needs to happen before the refinement?*
Allocation of tasks	Setting and dividing specific goals/tasks, but also asking co-workers to perform certain tasks. *Could you do that?*
Prior knowledge activation	Activation of prior knowledge or tasks. *We have done this before, it took a lot of time then.*

Monitoring. The initial subphases of monitoring were *monitor progress towards goals, what needs to be done, team member questioning, providing feedback and help seeking* (see table 4). During the coding process one subphase has been altered, one has been added and three have been removed. The subphase *monitor progress towards goals* was divided into *progress update* and *plan for completing the task*. During the stand-ups, every team members would give a short update about their progress, there was often no further elaboration about the plan they had for completing the task. Therefore, was it decided to divide this subphase. When team members elaborated on their work of the current day it was coded under the main phase planning because it was a planning activity rather than a monitoring activity.

During a meeting the teams were sometimes side-tracked, the meeting was started or closed, these regulation actions could not be accommodated with the existing subphases. Therefore, during the encoding process the subphase *regulation meeting* was created. This subphase was defined as, the regulation of the meeting by opening or closing it, the monitoring of time and pace remaining for that meeting, or regaining the focus on the meeting of two or more team members.

The subphases *providing feedback*, *help seeking behaviour* and *plan for completing the task* were eventually left out of the final coding scheme. The subphase *providing feedback* did not occur during the coding process, when feedback was given it was coded under one of the subphases of evaluation. *Help seeking behaviour* occurred four times, these utterances have been recoded under *team member questioning* and the definition of this subphase has been expanded, with asking for help. *Plan*

for completing the task occurred less than three times and these utterances have been recoded under, *what needs to be done* or *time planning*. The initial and final subphases of monitoring can be found in table 5.

Table 5. Initial and final subphases of monitoring

Initial	Final
- Monitor progress towards goals	- Progress update
- What needs to be done	- Regulation meeting
- Team member questioning	- What needs to be done
- Providing feedback	- Team member questioning
- Help seeking behaviour	

As with the subphases of planning, the definitions subphases of monitoring appeared to have some overlap during the coding process. The initial definition of *team member questioning*, was direction of the focus at the meeting, if the co-worker understands the task. However, during the coding process it was always that the whole team was side-tracked due to a joke or other social interaction, and not one particular team member. Because the whole team needed to refocus their attention instead of one person was it coded as *regulating meeting*. However, if there was only *one* person that needed to retain the focus in the meeting it would have been coded as *team member questioning*, but this was not encountered in the current study.

Also, the differences between the subphases *what needs to be done, plan for completing the task* and the planning subphase *time planning* were not always as clear as initially thought. Utterances such as, "we only have two days and there is still a lot to do" were coded under the subphase *what needs to be* done, further statements about how to handle that situation were coded under the main phase planning because the actions to handle that situation took place in future. Utterances such as "this does not work it we need a different plan", were coded with *plan for completing the task*, but the elaboration about the new plan was coded as *time planning*. Because the new plan or task would take place in the future. The final subphases with their definitions and examples can be found in table 6.

Table 6. Final coding scheme with definitions and examples of monitoring

Subphases	Definition
Progress update	Asking for or giving an update about the progress of the work. *Yesterday I resolved the bug and worked on the ART.*
Regulation meeting	The regulation of the meeting by opening or closing it, the monitoring of time and pace remaining for that meeting, or regaining the focus on the meeting of

	two or more team members. *Guys, can we go on with the review?*
What needs to be done	Monitoring the time and pace remaining and what needs to be done to complete the task or sprint. *Did you already looked at that?*
Team member questioning	Questions about the understanding of the task, asking for help, the answers on these questions and regaining focus on the meeting of one team member. *I don't understand can you elaborate on that?* *You found that branch did you?*

Evaluation. The initial subphases of evaluation were, *work method, co-worker evaluation of the process of effectives, process of efficiency* and the *product.* Only one code has been added and one code has been adjusted. During the coding process the sub code *external stakeholders* was added, the team also evaluated the work relationship with the product owner or client, but also how the organisation handles things. This could not be codded with the existing codes, therefore the new coded was created. The definition of this subphase is as follows, evaluation about communication and collaboration with external stakeholders and the team.

Table 7. Initial subphases of evaluation

Initial	Final
- Work method	- Work method
- Co-worker	- External stakeholders
- Process of effectives	- Co-worker and self
- Process of efficiency	- Process of effectives
- Product	- Process of efficiency
	- Product

In addition, during the meetings a team member could also reflected on him or herself. Because the team member does not reflect on a co-worker but the reflection was still about a team member, the subphase *co-worker* was expanded to *co-worker and self.* The initial and final subphases of evaluation can be found in table 7. The final subphases with their definitions and examples can be found in table 8.

Table 8. Final coding scheme with definitions and examples of evaluation

Subphases	Definition
Work method	Evaluation about the work method, what and why it needed to be improved or was better than the previous sprint/project.

	I liked it that we had time for technical stories.
	There were *few disturbances while there* were *a lot of changes this sprint.*
External stakeholders	Evaluation about communication and collaboration with external stakeholders and the team.
	They (clients) don't communicate about what they want.
Co-worker and self	Review on team members' or own skill, attitude or work.
	He quickly learned everything and adapted good to our team.
	He says that he wants to speak with you after a stand-up, but he never does.
Efficiency process	Evaluation about the efficiency of executing the sprint task, if the goal of the sprint/project is reaches and reason why or why not.
	We did a bad preparation for the demo.
	We've done all the tasks of this sprint thus the sprint is achieved.
Effectives process	Evaluation about the effectivity of the executing the sprint tasks, how resources are used during the sprint/project.
	Last time you said that we needed a few refinement sessions, but they never were *planned.*
	I think it is good that we decided to stop with adding new stories to the sprint.
Product	Judgement about the product or part of it, with argumentation.
	My users are very enthusiastic about the use of the application.
	The ''surrounding'' of …. is stable.

The extent of occurrence of the subphases

To answer the question to what extent the subphases of regulation manifest within the workplace. The frequencies, percentages and total duration of the subphases will be discussed by main phase. A total of 4645 utterances of socially shared regulation were analysed, for an overview see table 9.

Table 9. Results the main phases of regulation

Phase	Frequency	Percentage	TD in s	Percentage TD
Planning	3139	67.5%	28,791.3	60.0%
Monitoring	1048	22.6%	13,658.5	28.4%
Evaluation	458	9.9%	5,560.7	11.6%
Total	4645	100%	48,010.5	100%

Note. TD is total duration

Planning. Regarding the frequencies, it can be concluded that the subphases *time planning* occurred the most, then *discussing strategies*, *solving problems*, *allocation of task* and the subphase

prior knowledge activation the least (table 10). The ratio of percentage frequency and percentage total duration is with the subphases *discussing strategies, allocation of task* and *prior knowledge activation,* almost one to one. Whereas with the subphases *time planning*, the percentage total duration is lower than the percentage frequency, with the subphases *solving problems* this is vice versa.

Table 10. Results of the subphases of planning

Subphase	Frequency	Percentage	TD in s	Percentage TD
Time Planning	1223	39%	10,273.2	35.7%
Discussing strategies	967	30.8%	8,896.4	30.9%
Solving problems	592	18.8%	6,334.4	22.0%
Allocation of task	316	10.1%	2,938.8	10.2%
Prior knowledge activation	41	1.3%	348.5	1.2%
Total	3139	100%	28,791.3	100%

Note. TD is total duration.

Monitoring. As can be seen from table 11, the subphase *progress update* occurred the most, then *regulating meeting*, *what needs to be done* and the subphase *team member questioning* the least (table 11). *Progress update* accounts for 50% of the monitoring regulation while it accounts for more almost 70% of the total duration percentage. *Regulating meeting* on the other hand accounts for 37.4% whereas the total duration only accounts for 24.3%. The subphases *what needs to be done* and *team member questioning* also have in ratio higher frequencies percentage than total duration percentage, but the differences is not as profound as with *regulating meeting*. *Progress update* manifested only 13.5% more than *regulating meeting,* but the difference in total duration is almost 45%.

Table 11. Results of the subphases of monitoring

Subphase	Frequency	Percentage	TD in s	Percentage TD
Progress update	525	50,1%	9,376.6	68.7%
Regulating meeting	392	37,4%	3,320.2	24.3%
What needs to be done	76	7,3%	666.8	4.9%
Team member questioning	55	5,2%	294.9	2.1%
Total	1048	100%	13,658.5	100%

Note. TD is total duration.

Evaluation. Regarding the frequencies, it can be concluded that the subphase *working method* occurred the most, then *external stakeholders*, *co-worker and self*, *process of efficiency*, *process of effectiveness* and the subphase *product* the least (table 12). The percentage total duration is just as the frequency percentages ascending and the ratio between these two variables is with most subphases almost one to one. Only *extern stakeholders* and *product* have a difference greater than 2.6%, the other evaluation subphases less than 1.5%. The usage of the subphases compared to the other main phases

was less divided, the difference between the subphase that occurred the most and least is only 16.3% whereas with planning this lies at 37.7% and with monitoring at 44.9%.

Table 12. Results of the subphases of evaluation

Subphase	Frequency	Percentage	TD in s	Percentage TD
Working method	120	26.2%	1,512.5	27.2%
Extern stakeholders	97	21.2%	1,338.6	24.1%
Co-worker and self	75	16.3%	862.5	15.5%
Process of efficiency	66	14.4%	800.4	14.4%
Process of effectiveness	59	12.9%	637.2	11.4%
Product	41	9.0%	409.5	7.4%
Total	458	100%	5,560.7	100%

Note. TD is total duration.

The extent of occurrence of the subphases in different meetings

To answer the question about variation of the occurrence of regulation in meetings with a different goal attainment, the subphases by meetings were analysed. To make an comparison of the occurrence of a subphase between the meetings, the percentage are used. For a more informative presentation of the results the frequencies of the subphases are also presented. First, the hypotheses stated in the current study, will shortly be discussed. It was hypothesized that during the meetings planning and refinements the main phase, planning would be most profound, this was indeed the case it accounted for more than 84% of the regulation occurrence in those meetings (table 13). Surprising, the phase planning manifested for more than 50% in all the meetings. In addition, it was stated that during the stand-ups an extensive part of the regulation would be used for the planning and monitoring regulation activities this was also in line with the results (table 13). At last, was it expected that during the retro the phases evaluation and planning would be extensively used, what was also in line with the results (table 13). Surprisingly planning occurred more than evaluation while it was expected that evaluation would be the most profound most used phase during the retro.

Table 13. Results of the main phases in different meetings

	Stand up	Retro	Refinement	Planning
Planning	54.6% (692)	51.4% (653)	84.0% (1034)	86.5% (760)
Monitoring	44.1% (559)	14.2% (180)	15.8% (195)	13% (114)
Evaluation	1.3% (16)	34.4% (436)	0.2% (2)	0.5% (4)
Total	100% (1267)	100% (1269)	100% (1231)	100% (878)

Note. The displayed numbers are percentages and frequencies of the manifestation of the main phases within each meeting.

Planning. The main phase planning accounts for more than 50% of the regulation in every kind of meeting (table 14). During the stand-ups, the occurrence of the subphases of planning were in comparison with the other meetings more equally divided, except that the subphases *prior knowledge activation* did not occur at all during the stand-ups. However, the differences between the most occurred subphase, *time planning* and the least *solving problems* was 15.6%. Whereas, this lies with the retro at 65.7%, refinement at 51.1%, and planning at 50.7%. During the refinement and planning the subphases *time planning* and *discussing strategies* account for almost all regulation (more than 90%), *solving problems* rarely occurred, less than 1%. Whereas during the retro this subphase accounted for almost 70% of the planning regulation.

Table 14. Results of the subphases of planning in different meetings

	Stand up	Retro	Refinement	Planning
Time planning	34.5% (239)	8.9% (58)	51.6% (534)	51.6% (392)
Discussing strategies	20.4% (141)	14.5% (95)	41.5% (429)	39.8% (302)
Solving problems	18.9% (131)	68.8% (449)	0.5% (5)	0.9% (7)
Allocation of tasks	26.2% (181)	4.7% (31)	5.3% (55)	6.4% (49)
Prior knowledge activation	-	3.1% (20)	1.1% (11)	1.3% (10)
Total	100% (692)	100% (653)	100% (1034)	100%(730)

Note. The displayed numbers are relative percentages and frequencies of the manifestation within each meeting.

To see whether the occurrence of the same planning subphases significantly differed between the meetings, a chi-square analysis was performed per subphase. Because not the same amount of time was coded of every meeting, were the subphases calculated to relative frequencies. The analyses showed significant differences of the occurrence of the planning subphases between the different meetings, see table 15. These results imply that the usage of the planning subphases between the meetings differs not by chance alone.

Table 15. Chi-square analyses of the planning subphases occurrence between meetings

Subphases	Chi-square outcome
Time planning	χ^2 (3) = 261.66, p = .000
Discussing strategies	χ^2 (3) = 150.54, p = .000
Solving problems	χ^2 (3) = 1092.77, p = .000
Allocation of task	χ^2 (3) = 236.75, p = .000
Prior knowledge activation	χ^2 (2) = 10.86, p = .004

Monitoring. The overall manifestation of monitoring with the meetings refinement, retro and planning was lower than 16%, whereas during the stand-ups monitoring accounted for 44.1% (table 16). The subphases *team member questioning* and *what needs to be done* occurred less than 5.6% of the

monitoring regulation in the meetings refinement, retro and planning. During the stand-up the manifestation was higher, but not more than 11.8%. The subphase *regulating meeting* occurred the most in the meetings except for during the stand-up, there the subphase *progress update* was most profound.

Table 16. Results of the subphases of monitoring in different meetings

	Stand up	Retro	Refinement	Planning
Progress update	69.8% (390)	16.1% (29)	30.3% (59)	41.2% (47)
Regulating meeting	10.7% (60)	78.3% (141)	67.6% (132)	51.7% (59)
What needs to be done	11.8% (66)	-	2.1% (4)	5.3% (6)
Team member questioning	7.7% (43)	5.6% (10)	-	1.8% (2)
Total	100% (559)	100% (180)	100% (195)	100% (114)

Note. The displayed numbers are relative percentages and frequencies of the manifestation within each meeting.

To see whether the occurrence of the same monitoring subphases significantly differed between the meetings, a chi-square analysis was performed per subphase. Because not the same amount of time was coded of every meeting, were the subphases calculated to relative frequencies. The analyses showed significant differences of the occurrence of the monitoring subphases between the different meetings, see table 17. These results imply that the usage of the monitoring subphases between the meetings differs not by chance alone.

Table 17. Chi-square analyses of the monitoring subphases occurrence between meetings

Subphases	Chi-square outcome
Progress update	χ^2 (3) = 104.10, p = .000
Regulating meeting	χ^2 (3) = 133.402, p = .000
What needs to be done	χ^2 (2) =20.92, p = .000.
Team member questioning	χ^2 (2) = 8.75, p = .013

Evaluation. Compared to the other main phases, evaluation only manifested extensive during the retro (table 18). Regarding the retro, the subphase *work method* occurred the most, and *product* the least. A prerequisite for a chi-square analysis is that the cells should have a frequency greater than five. The meetings stand-up, refinement and planning all had a manifestation of the subphases of five or less. Therefore, no chi-square analysis was performed.

Table 18. Results of the subphases of evaluation in different meetings

	Stand up	Retro	Refinement	Planning
Work method	6.3% (1)	27.3% (119)	-	-
Extern stakeholders	31.2% (5)	20.2% (88)	100% (2)	50% (2)
Co-worker and self	6.3% (1)	17.0% (74)	-	-

Efficiency	25.0% (4)	14.0% (61)	-	25% (1)
Effectiveness	31.2% (5)	12.2% (53)	-	25% (1)
Product	-	9.3% (41)	-	-
Total	100% (16)	100% (436)	100% (2)	100% (4)

Note. The displayed numbers are relative percentages and frequencies of the manifestation within each meeting.

Conclusion

In this study, the occurrence of socially shared regulation within the workplace have been studied. Specifically, the subphases of socially shared regulation. With this focus the aim was to clarify and sharpen the definitions of the regulation phases of socially shared regulation. In addition, with the relevant literature a coding scheme was developed to code the collected data. Through the coding process a new coding scheme was established, which can be used in further research for socially shared regulation within the workplace. The conclusion consists of the following elements, first the research questions stated in the introduction will be answered, from these results the new definitions will be presented and compared to definitions found in other studies. These aspects will be presented by regulation main phases, due to the integrated parts of the research questions and the new definition for the regulation main phase that follows from it. The limitations and suggestions for further research will be discussed. At last a deliberation of the practical and scientific implications will be made.

Planning in the workplace

The subphases of planning that manifest within the workplace are, *time planning, prior knowledge activation, allocation of task, discussing strategies* and *solving problems.* The first three subphases have not been changed during the coding process, which suggest that these aspects of planning regulation are less context dependent than for example subphases that have been removed during coding. Almost 70% of the regulation is spend on planning. From this planning regulation, the subphases *time planning* and *discussing strategies* are most profound. It can be stated that the team members spend a lot of time discussing what the plan is, the best strategy, the time investment, or deadline for the task, and that these phases are an important aspect during the meetings. Although *time planning* is most profound, the total duration is shorter in ratio compared to the other subphases. A reason for this might be that the teams do not discuss long about the plan or what the time span is for a task or the project. Regarding the high manifestation of this subphase, could it be that the subphase *time planning* and planning overall is more evident in a workplace context because in a school setting tasks could be more structured and planned for the students with pre-set objectives (Tynjälä, 2008). Whereas here, the employees have more freedom in which order they develop and finish certain task. However, it seems that teams could benefit from tools that cause the teams to spend less time on their planning activities. In such, more time could be spend on work or other regulation activities.

The subphases of *solving problems* and *discussing strategies* account for 50% of the planning regulation, these phases have not had much attention in the studies which the coding scheme was based on. A reason for this can be that within a school setting, problems are more structured and there are identifiable outcomes, which is the opposite of the workplace (Tynjälä, 2008). Therefore, students could make less use of discussing strategies or solving problems in comparison of other subphases of regulation. In addition, when a problem arises at the workplace the urge for solving it can be higher because it could cause a malfunction in the product that is being developed, which can cause serious constraints or delays for the team. With the division of these two subphases, the differences between the meetings is more profound. During the retro, *solving problems* occurred more than 68%, but it barely manifested during the meetings refinement and planning. Whereas with *discussing strategies* this is reversed. This indicates that certain subphases of regulation are more dependent of the objective of the meeting.

Prior knowledge activation was compared to the other subphases low in occurrence. While, it could be very useful to compare task or difficulties to previous task for example. It can be that a lot of the tasks encountered were new for the team members or that they did not make use of their previous knowledge. If this was the case than the teams could be encouraged to make more use of their prior knowledge. In addition, *prior knowledge activation* did not occur during the stand-ups. This could be due to the objective of the stand-ups, updating each other about the progress and which task they will do that day, the need for prior knowledge activation could not be urgent or the team members appealed on each other's the prior knowledge outside the stand-ups.

In addition, it was expected that during the retro meetings evaluation would have been the most profound regulation main phase. However, the main phase planning was with 17.1% more profound than evaluation. A reason for this result could be that the team members quickly moved from evaluating the problem, task or project to solving it or how it could be improved in the future, thus the team members moved from evaluation regulation to planning regulation in a timely manner.

Definition of planning. Concluding, the regulation of planning in the workplace is mostly focused on creating a plan for a task or project and what the best strategy is to use for executing a task, the discussing of how to solve problems that the teams encounter and whom will perform the task and if these kind of projects, task, or plans have been done before. Characteristic for regulation in the workplace is that most time is spend on planning activities.

The studies that have been used for the coding scheme were reviewed for definitions of the phases of socially shared regulation. Three distinct definitions were found, Duffy et al., (2014) state that "planning involves the selection of appropriate strategies and goals, as well as the allocation of resources that affect performance" (p.420). Whereas in this study also activities such as prior knowledge activation has been found. Also, the definition of Rogat and Linnenbrink-Garcia (2011) state not explicitly the regulation of prior knowledge activation. But also, their definition could have been more explicit in emphasizing of setting out a plan for the task of project. Rogat and Linnenbrink-Garcia (2011) state

planning as "reading and interpreting task directions designation task assignments, discussing how to go about solving problems" (p.384). At last Grau and Whitebread (2012) state that planning involves "decision making, initial appraisal of the task" (p.409). Compared with the results of the current study, this definition lacks emphasis on problem solving and setting up a plan or a time path. With the results of the current study and the definitions of these three studies the following definition of planning has been formulated.

> *Planning involves activities, that will be carried out in the (near) future, of setting out a plan, the allocation of the task, how to solve problems and what the best strategy is with possible prior knowledge to handle a certain task or problem.*

Monitoring in the workplace

Progress update, regulating meeting, team member questioning and *what needs to be done* were the subphases of monitoring that manifested in this context. The three subphase *progress update, team member questioning* and *what needs to be done* did not have had further changes than discussed in the results section. Which implies that these phases are evident in different kind of contexts.

As can be recalled from the result section, monitoring has had some changes during the coding process. The phase *regulating meeting* has been created during the process. A reason that this subphase was not found in other studies could be that these studies did not regarded it as regulation. However, Rogat and Linnenbrink-Garcia (2011) coded these kinds of utterances under behavioural management. In the other studies that the coding scheme was based on, no sub code was presented that compared with the code *regulating meeting* of the current study. In this study, utterances were regarded as regulation when they were aimed at reaching a shared conceptual understanding and task work. To accomplish this conceptual understanding, it is necessary for team members to pay attention, but also make effective use of the time that is scheduled for a meeting. Therefore, during the meeting the teams also need to monitor the time and pace that is left for the rest of the meeting.

Three subphases were not found in the current study, *providing feedback*, *help seeking* and *plan for completing the task*. This is mainly due to similarities with other subphases. For example, *help seeking* could also be part of *team member questioning*, because a team member asks the other team member(s) for help. This subphase was based on the study of Duffy et al., (2014) which did not further elaborated on the definition of subphases presented in there study. *Providing feedback* was regarded as evaluation of the co-worker in the current study, and thus coded under the main phase of evaluation. This subphase was based on the study of Rogat and Linnenbrink-Garcia (2011) and they did not encounter any evaluation, during their coding. Which can explain the subphases *providing feedback*, because this was encountered during their study. During the coding process of the current study, it became clear that the subphase *plan for completing the task* had similarities with the subphase *planning time*. Rogat and Linnenbrink-Garcia (2011) have in their coding scheme for planning, the description

revisiting the plan and or task directions whereas for monitoring *modify the plan* is stated. This was conceived as the same in this study. As stated in the result section, during the coding process of the current study, the subphase *plan for completing the task* was used when teams stated that the plan needed to change because the current plan did not work. But the teams made no such statements, it was observed that teams immediately begun to make a new plan. The subphases *providing feedback, help seeking* and *plan for completing the task* exposes that there are different definitions and interpretations of the phases of regulation. Which should be considered when coding schemes are presented and when studies make use of a coding scheme from another study.

Thus, the subphase *regulating meeting, progress update, team member questioning* and *what needs to be done* manifested in this context. *Progress update* and *regulating meeting* accounted for 87% of the regulating of monitoring. Looking at the division of the subphase between the different meetings, it shows that *progress update* is evident in all the meetings, but most during the stand-ups. Which is not surprising because during the stand-ups the team members mostly updated each other on their progress. *Regulating meeting* manifested over 50% with the meetings retro, refinement and planning, while during the stand-up this was only for 10.7%. This could suggest that when meetings last longer the teams need to regulate their meetings more. In addition, the team members could also need less regulating during a stand-up because the team members know what to expect and how the meeting will evolve. Also, the tasks they discuss during the stand-up are all known within the team due to previous stand-ups, but also due to the planning and refinement meetings. While during a planning or a retro the duration varies but also the content that will be discussed, the tasks differ and are often new for the team during a planning or refinement meeting.

What needs to be done, was mentioned by and Rogat and Linnenbrink-Garcia (2011) and accounted for 6.9%. Compared to the subphase *progress update* this seems low, but the teams often stated shortly what needed to be done and then formed a plan to getting the task done. This shows the time-ordered sequence of regulation, the teams monitor that the current plan is not working and a new plan is needed thus the teams move from monitor regulation to planning regulation. Rogat and Linnenbrink-Garcia (2011), also found in their study that there was an overlap between the phases planning and monitoring and these regulation phases did not occur in isolation and they influenced each other.

Team member questioning was mentioned in three other studies however accounted only for 5% of the monitoring (Azevedo et al., 2004; Duffy et al., 2014; Rogat & Linnenbrink-Garcia, 2011). It could be that students ask for more help in comparison to employees or that employees were less inclined to ask for help. Another explanation could be that employees ask for help during the work for small task or problems instead of during the meetings.

Definition of monitoring. Thus, with the results of the current study can it be stated that monitoring in the workplace includes the activities of keeping the rest of the team updated about the progress of the project or task, monitoring the remaining time and pace of the project and the meeting

and when needed asking for help or if another team member understand the task or content. Regarding the different kind of meetings that can be encountered in an agile context, the longer the meetings, the more regulating of the meeting takes place. In addition, monitoring is manifested in lesser extent than planning, for all the different kind of meetings. Which indicates that the team spend most of their regulation on planning the task or project. Definitions of monitoring have been found in three studies. The definition of Duffy et al., (2014) for the main phase monitoring is as follows, "Monitor of one's awareness of comprehension and task performance stated in the article, adjusted to the study monitoring of one's online awareness of comprehensions and task performance" (p.420). The current definition expends the definition of Duffy et al., (2014) by including updating team members about the progress, the monitoring of what needs to be done and keeping the team focused on the task at hand. Rogat and Linnenbrink-Garcia (2011) state monitoring as "Evaluating content understanding, the shared product assessing progress or plan for completing the task" (p.384). The current definition expends the definition of Rogat and Linnenbrink-Garcia (2011) by including the regulation of the meeting to keep the team focused on the task at hand. Grau and Whitebread (2012) define monitoring as "awareness and monitoring of various aspects of cognition, beliefs, affects and motivational states" (p. 409). Which includes various aspects that not have been taken into consideration of the current study such as the beliefs, affects and motivational states which is beyond the scope of this study. But there is no explicit emphasis on the monitoring or progress of the task or project or what still needs to be done to complete the task. Surprising is that Grau and Whitebread (2012) have also a phase regulation, which is defined as "selection and use of various cognitive strategies for learning, reasoning, memory, thinking, motivation and emotion. It comes after a monitoring of the task" (p. 409). In the current study, this could be interpreted as *planning time or discussing strategies*, because the strategy or plan for a task is changed and the execution of this change lies in the (near) future, it is the realization that the current plan does not work, which is regarded as monitoring, and the development of a new plan, which is regarded as planning in the current study. With the definitions of the other studies in mind and the results of the current study, the following definition of monitoring has been created.

> *Monitoring activities involves updating other team members about the progress of the task or project, if any difficulties have been encountered but also the monitoring of what needs to be done to complete the task or project, if team members comprehend the task or discussion and the regulation of a meeting to the team on track.*

Evaluation in the workplace

Evaluation regulation in the workplace includes assessments of the *product, external stakeholders, work method, co-worker and self, process of effectives and process of efficiency.* During the coding process, only two changes have been made with the evaluation subphases. The code *external stakeholders* has been added, which is not surprising considering the context of the study. Within the

workplace, employees often work with clients, executives and higher authorities. The second change that has be made was adding self-evaluation to the sub phase *co-worker*. Most of the evaluation was generally about the team, but a few utterances have been about the employee itself.

Of the six subphases of evaluation, only three were based on subphases found in other studies. Whereas with planning all the subphases were based on several studies and with monitoring only one subphases was created. The subphases that were created of evaluation were mostly due to the different context of this study compared to the studies of socially shared regulation.

The overall occurrence of evaluation is low compared to the other two phases, this can imply that more emphasis is needed on the usage of evaluation during the meetings. However, compared to the studies where the coding scheme was based on, evaluation manifested more in the current study (Azevedo et al., 2004; Didonato, 2012; Duffy et al., 2014). This could be due to that in the current study there was a meeting specifically held for evaluation. In addition, with the short iterative sprints the teams could apply the evaluated often already in the next sprint and see the effect of what the teams wanted to improve. Although regulation is a time ordered sequence evaluation was most profound in the meeting aimed for the evaluation of the sprint, in the other three meetings less than 1.4% of the regulation was aimed at evaluation. Which can imply that when meetings not specifically address evaluation it rarely takes place. Which thus can explain the results of the other studies that students need to be prompted to show evaluation regulation. Another reason can be that the teams do not see the need to evaluate during meetings where the objective does not include evaluation. However, it could be that brief evaluation moments during a stand-up or refinements can aid the team. For example, “how did the project/task went last time, how are we going to deal with it this time?”.

Definition of evaluation. Concluding, evaluation has various aspects that manifest in the workplace. Teams evaluate their work method, their effectivity and efficiency of the work process, their self and their team members and the collaboration with the external stakeholders. Other studies have defined evaluation as follows, “appraising the products, effectiveness and efficiency of one’s approach, technique or strategy” (Duffy et al., 2014 p.420). Grau and Whitebread (2012) state that evaluation “involves learners’ judgement, evaluation attributions and emotional reactions to their performance.” The current definition expends these definition by including *external stakeholders,* but also the evaluation of the self. However, the addition of *external stakeholders* is not necessarily applicable to the studies such as Duffy et al., (2014) and Grau and Whitebread (2012) because in there study the participants do not work with an external client which often can be the case at the workplace. The new definition for evaluation is as follows.

> *Evaluation involves activities that are aimed at improvement of the collaboration with stakeholders, team members and the self but also the evaluation of the product, efficiency and effectives of the work process and the work method.*

Limitations and further research

In the current study, there were several limitations. First, the data was collected of three teams in only one company in one branch, which limits the generalizability of the findings. But with this study an explorative first step could be made into the occurrence of the socially shared regulation subphases in a workplace setting and an in-depth analysis of the data. However, further research is needed to see whether the same results are found in different companies with the same agile work method or in companies with different work methods. It may be the case, for instance, that the difference between meetings is not so profound when the objective of the meetings is not as clear as with the scrum work method. The second limitation in this research was that a comparison between the occurrence of regulation of the teams and their performance not could be made. Such a comparison could aid to the empirical evidence in which way regulation enhances team performance, or that there are differences in regulation between teams. A last limitation in the current study is the statistics. There was no randomization of teams, no manipulation, participating was voluntary and the teams were already formed before the study. However, more than 4600 utterance were used for the data analysis. Which gives a representable representation of how regulation upholds in this context.

A recommendation for further research is to study the effect of the sequence of the manifestation of regulation. Different scholars already support the view of studying the effect of temporality and sequentially in regulation (e.g. Bannert, Reimann, & Sonnenberg, 2014; Molenaar & Järvelä, 2014; Schoor & Bannert, 2012). Frequency and total duration only provide information about isolated events, scholars state that difference in sequence of regulation activities also can have an effect, on for example team performance (e.g. Bannert, Reimann, & Sonnenberg, 2014; Molenaar & Järvelä, 2014; Schoor & Bannert, 2012).

A second recommendation follows from several scholars whom have shown that the effectiveness of regulation is also dependable on the quality of interaction (e.g. Iiskala et al., 2011; Molenaar, 2011; Volet, Vauras, et al., 2009). Quality of regulation interaction could explain the difference in performance between teams that show the amount of regulation. For example, a team regulates their work but do not engage in each other's regulation. Results show that regulation took place, but without the engaging of the team members in each other's regulation, the regulation could overall have less effect than when the team members did engage.

The last recommendation is that further research is needed of socially shared regulation at the workplace and how this can aid team performance. Although scholars agree upon the importance of seeing regulation as well as an individual as a social process (Iiskala et al., 2011; Volet, Vauras, et al., 2009), empirical evidence is still scare about how socially shared regulation can particularly help teams perform better at the workplace, especially compared to the extensive conceptual and empirical studies on self-regulation done in school.

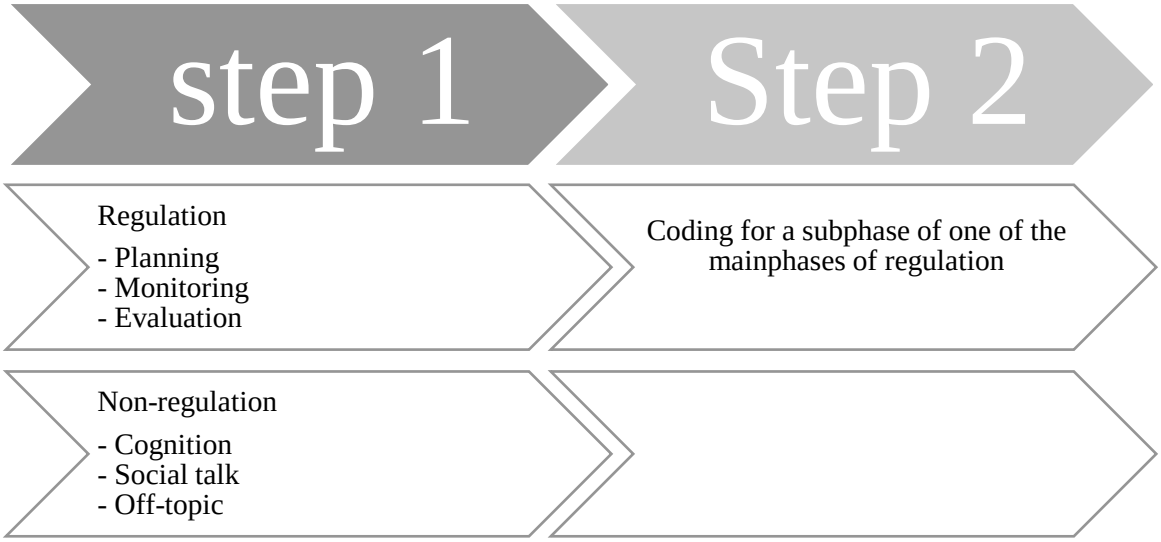
Practical and scientific implication

The current study shows how socially shared regulation manifest with IT teams at the workplace. Several practical implications can be derived from these results. Teams spend most of their time on planning activities, especially time planning. Also, discussing strategies and solving problems are profound. Teams could profit from tools or prompts that aid them in faster or easier planning of a task or project. In addition, prompts or tools for a more structured discussing or guidelines for solving problems could help. When less time is spend on these planning activities, the teams can focus more on the evaluation of their task or projector the actual work. The results of the current show that teams spend less than ten percent of their time on evaluation activities. While evaluation could be a powerful concept in enhancing performance, particularly with an agile work method where iterative cycles follow each other rapidly. With these iterative cycles the teams can directly apply the evaluated content and improve the product or themselves. Prior knowledge activation and the monitoring of what needs the be done could also be prompt more. Prior knowledge activation could aid in a more realistic representation of how much time is needed for the task or how to execute a task in a certain manner. What needs to be done is useful to see if the team is still on track and if the plan needs alternation. Concluding, teams that work within an IT setting could gain the most from prompts for a structured use of planning activities, so less time is spend on planning and there is more room for evaluation activities or work.

Several scientific implications could be made from the current study. The results suggest that the occurrence of regulation and her subphases are depend on the objective of the regulation. It is important to consider the objective dependent occurrence of regulation when studies are compared to each other. In addition, new subphases were created during the coding progress which can aid the research in regulation within a workplace setting. Also, the ambiguity of several subphases have been discussed and new definitions of the subphases have been presented. At last, with the results new definitions of socially shared regulation have been developed which can hopefully aid in further research.

This study aimed to develop clear definitions of the main phases of socially shared regulation and in the process a new coding scheme was developed with examples and definitions. These definitions and coding scheme can help in future research of socially shared regulation in the workplace. The past decade has shown that socially shared regulation can be a powerful process to enhance the collaboration between team members, but also the shared content understanding and overall team performance. With an increasingly reliance on human resources and teams within organisations, socially shared regulation should get the attention it deserves in a workplace setting, because the implication of the use of this concept could provide an advantage for teams and organisations.

Appendix 1


step 1
Step 2
Regulation
- Planning
- Monitoring
- Evaluation
Coding for a subphase of one of the mainphases of regulation
Non-regulation
- Cognition
- Social talk
- Off-topic

References

Akkerman, S., Van den Bossche, P., Admiraal, W., Gijselaers, W., Segers, M., Simons, R. J., & Kirschner, P. (2007). Reconsidering group cognition: From conceptual confusion to a boundary area between cognitive and socio-cultural perspectives? *Educational Research Review*, *2*(1), 39–63.

Alper, S., Tjosvold, D., & Law, K. S. (1998). Interdependence and controversy in group decision making: antecedents to effective self-managing teams. *Organizational Behavior and Human Decision Processes*, *74*(1), 33–52.

Azevedo, R., Winters, F. I., & Moos, D. C. (2004). Can students collaboratively use hypermedia to learn science? The dynamics of self-and other-regulatory processes in an ecology classroom. *Journal of Educational Computing Research*, *31*(3), 215-245.

Baard, S. K., Rench, T. A., & Kozlowski, S. W. (2014). Performance adaptation: A theoretical integration and review. *Journal of Management*, *40*(1), 48-99.

Bannert, M., Reimann, P., & Sonnenberg, C. (2014). Process mining techniques for analysing patterns and strategies in students' self-regulated learning. *Metacognition and Learning*, *9*(2), 161–185.

Barron, B. (2009). Achieving coordination in collaborative problem-solving groups. *The Journal of the Learning Sciences*, *9*(4), 403–436.

DeShon, R. P., Kozlowski, S. W., Schmidt, A. M., Milner, K. R., & Wiechmann, D. (2004). A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. *Journal of applied psychology*, *89*(6), 1035.

DiDonato, N. C. (2013). Effective self- and co-regulation in collaborative learning groups: An analysis of how students regulate problem solving of authentic interdisciplinary tasks. *Instructional Science*, *41*(1), 25–47.

Duffy, M. C., Azevedo, R., Sun, N. Z., Griscom, S. E., Stead, V., Crelinsten, L., … Lachapelle, K. (2014). Team regulation in a simulated medical emergency: An in-depth analysis of cognitive, metacognitive, and affective processes. *Instructional Science*, *43*(3), 401–426.

Florin, J., Lubatkin, M., & Schulze, W. (2003). A social capital model of high growth ventures. *Academy of Management Journal*, *46*(3), 374–384.

Fong, P. S. W. (2003). Knowledge creation in multidisciplinary project teams: An empirical study of the processes and their dynamic interrelationships. *International Journal of Project Management*, *21*(7), 479–486.

Grau, V., & Whitebread, D. (2012). Self and social regulation of learning during collaborative activities in the classroom: The interplay of individual and group cognition. *Self and Social Regulation of Learning during Collaborative Activities in the Classroom: The Interplay of Individual and Group Cognition*, *22*(6), 401–412.

Hadwin, A. F., & Oshige, M. (2011). Self-regulation, coregulation, and socially shared regulation: Exploring perspectives of social in self-regulated learning theory. *Teachers College Record*, *113*(2), 240–264.

Hadwin, A. F., Wozney, L., & Pontin, O. (2005). Scaffolding the appropriation of self-regulatory activity: A socio-cultural analysis of changes in teacher-student discourse about a graduate research portfolio. *Instructional Science*.

Hurme, T. R., & Järvelä, S. (2005). Students' activity in computer-supported collaborative problem solving in mathematics. *International Journal of Computers for mathematical learning*, *10*(1), 49-73.

Iiskala, T., Vauras, M., Lehtinen, E., & Salonen, P. (2011). Socially shared metacognition of dyads of pupils in collaborative mathematical problem-solving processes. *Learning and Instruction*, *21*(3), 379–393.

Janssen, J., Erkens, G., Kirschner, P. A., & Kanselaar, G. (2012). Task-related and social regulation during online collaborative learning. *Metacognition and Learning*, *7*(1), 25–43.

Kauffeld, S. (2006). Self-directed work groups and team competence. *Journal of Occupational and Organizational Psychology*, *79*, 1–21.

Khosa, D. (2014). Processes of metacognitive regulation and knowledge co-construction in case-based collaborative learning at university. *Doctoral Dissertation, Murdoch University*.

Konradt, U., Schippers, M. C., Garbers, Y., & Steenfatt, C. (2015). Effects of guided reflexivity and team feedback on team performance improvement: The role of team regulatory processes and cognitive emergent states. *European Journal of Work and Organizational Psychology*, *24*(5), 777-795.

Littlejohn, A., Milligan, C., & Margaryan, A. (2012). Charting collective knowledge: Supporting self-regulated learning in the workplace. *Journal of Workplace Learning*, *24*(3), 226-238.

Moe, N. B., Dingsøyr, T., & Dybå, T. (2010). A teamwork model for understanding an agile team: A case study of a Scrum project. *Information and Software Technology*, *52*(5), 480–491.

Molenaar, I. (2011). *It's all about metacognitive activities: Computerized scaffolding of self-regulated learning*. Ipskamp Drukkers BV.

Panadero, E., & Järvelä, S. (2015). Socially shared regulation of learning: A review. *European Psychologist*.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In *Handbook of Self-Regulation* (pp. 451–502). Elsevier.

Rising, L., & Janoff, N. S. (2000). The Scrum software development process for small teams. *IEEE Software*, *17*(4), 26–32.

Rogat, T. K., & Linnenbrink-Garcia, L. (2011). Socially shared regulation in collaborative groups: An analysis of the interplay between quality of social regulation and group processes. *Cognition and Instruction*, *29*(4).

Schoor, C., & Bannert, M. (2012). Exploring regulatory processes during a computer-supported collaborative learning task using process mining. *Computers in Human Behavior*, *28*(4), 1321–1331.

Schoor, C., Narciss, S., & Körndle, H. (2015). Regulation during cooperative and collaborative learning: A theory-based review of terms and concepts. *Educational Psychologist*, *50*(2).

Schwaber, K. (1997). Scrum development process. *Business Object Design and Implementation.* Springer London , 1997. 117 - 134.

Scrum begrippen. (n.d.). Retrieved January 24, 2017, from http://www.scrum.nl/site/Wat-is-Scrum-agile-scrum

Tynjälä, P. (2008). Perspectives into learning at the workplace. *Educational research review*, *3*(2), 130-154.

Unger, J., Rauch, A., & Rosenbusch, M. (2011). Human capital and entrepreneurial success: a meta-analytical review. *Journal of Business Venturing*, *26*(3), 341–358.

Van den Bossche, P., Gijselaers, W., Segers, M., Woltjer, G., & Kirschner, P. (2011). Team learning: building shared mental models. *Instructional Science*, *39*(3), 283-301.

Van der Vegt, G. S., & Bunderson, S. J. (2005). Learning and performance in multidisciplinary teams: The importance of collective team identification. *Academy of Management Journal*.

Volet, S., Summers, M., & Thurman, J. (2009). High-level co-regulation in collaborative learning: How does it emerge and how is it sustained? *Learning and Instruction*, *19*(2), 128–143.

Volet, S., Vauras, M., & Salonen, P. (2009). Self- and social regulation in learning contexts: An integrative perspective. *Educational Psychologist*, *44*(4).