Socially Shared Regulation of Learning: A Review

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Abstract

Socially shared regulation of learning (SSRL) has been recognized as a new and growing field in the framework of self-regulated learning theory in the past decade. In the present review, we examine the empirical evidence to support such a phenomenon. A total of 17 articles addressing SSRL were identified, 13 of which presented empirical evidence. Through a narrative review it could be concluded that there is enough data to maintain the existence of SSRL in comparison to other social regulation (e.g., co-regulation). It was found that most of the SSRL research has focused on characterizing phenomena through the use of mixed methods through qualitative data, mostly video-recorded observation data. Also, SSRL seems to contribute to students’ performance. Finally, the article discusses the need for the field to move forward, exploring the best conditions to promote SSRL, clarifying whether SSRL is always the optimal form of collaboration, and identifying more aspects of groups’ characteristics.
Socially Shared Regulation of Learning: A Review

How students regulate their own learning through the use of strategies has been one of the most important topics in educational psychology for the past decades. These studies started receiving considerable attention after Flavell (1979) introduced the metacognition theory, and this attention continued when self-regulation theories started to develop (Boekaerts, Pintrich, & Zeidner, 2000; Zimmerman & Schunk, 2011). Currently there is a strong consensus that successful learners use a repertoire of strategies – cognitive, behavioral, and motivational – to guide and enhance their learning processes while completing academic tasks (Schunk & Zimmerman, 2008). The mainstream of research on self-regulation has focused on individual learning situations, but the notion that social context is important in students’ self-regulated learning is evidenced in a wide range of SRL researches, and research into social aspects of SRL has increased considerably in recent years (Hadwin, Järvelä, & Miller, 2011).

Grounded in Zimmerman’s (1989) social cognitive model of self-regulation, research has been guided by the principles that social context and environment play a reciprocal role in self-regulated learning (SRL), which is embedded in social context and influence. SRL research is also framed by sociocultural explanations: social interactions with others who are more capable facilitate students’ development of SRL through internalizing the modeled cognitive processes (e.g., Vygotsky, 1978). The premise of this research is that SRL is an internal process, assisted and influenced by social interaction (e.g., Zimmerman, 1990). Thus, it means investigating social support as an independent variable on SRL and examining a wide variety of social supports, including modeling, scaffolding, and other-regulation, such as support provided by peers, teachers, and parents (McCaslin & Hickey, 2001; Paris & Paris, 2001).
The term co-regulated learning is grounded in Vygotskian views of higher psychological processes being socially embedded or contextualized (Vygotsky, 1978) and Wertsch and Stone’s (1985) notion that these processes are internalized through social interaction (McCaslin, 2009). McCaslin and Hickey (2001) defined co-regulation as a manifestation of emergent interaction within a zone of proximal development, and Volet, Vauras, and Salonen (2009) grounded the concept of other-regulation in the Vygotsky (1978) notions of the Zone of Proximal Development and scaffold guidance from other-regulation to self-regulation.

Recently, the concept of socially shared regulation of learning (SSRL) has emerged, which occurs when groups regulate together as a collective, such as when they construct shared task perceptions or shared goals. When groups co-construct plans or align monitoring perceptions to establish a shared evaluation of progress, they are engaged in shared regulation (Järvelä, Järvenoja, Malmberg, & Hadwin, 2013). SSRL involves interdependent or collectively shared regulatory processes, beliefs, and knowledge (e.g., strategies, monitoring, evaluation, goal setting, motivation, metacognitive decision making) orchestrated in the service of a co-constructed or shared outcome (Winne, Hadwin, & Perry, 2013; Järvelä & Hadwin, 2013).

Interest in shared regulatory group processes has emerged since a change in pedagogical practices in current learning environments. Past decades have witnessed the success of collaborative learning, since it allows opportunities for shared knowledge construction and productive collaborative interactions (Dillenbourg, 1999; Roschelle & Teasley, 1995). Information and communication technologies as CSCL have fundamentally changed how people communicate, collaborate, work, play, and learn – but have also brought new challenges for group coordination, argumentation, and engagement (Järvelä, Volet, & Järvenoja, 2010). Hadwin et al. (2011) claim that regulated learning is the quintessential skill in collaborative learning. Working together means co-constructing shared task representations, shared goals, and shared strategies. It also means
regulating learning through shared metacognitive monitoring and control of motivation, cognition, and behavior.

In sum, in the past decade there has been a shift in the SRL field: the role that collaborative learning and CSCL environments imply for the regulation of learning is now a research focus (e.g., Järvelä et al., 2010; Vauras, Iiskala, Kajamies, Kinnunen, & Lehtinen, 2003). The focus in this research line is on how the groups regulate their collaborative work and how this affects their learning experience as a group. Currently, the concept of socially shared regulation is increasingly being used in educational psychology literature and it is spreading to other related fields as well, for example computer-supported collaborative learning (Kirschner & Erkens, 2013). Compared to other regulatory concepts, such as SRL and co-regulation, the empirical evidence of regulatory processes in collaborative learning – this is to say, socially shared regulation of learning (SSRL) – is still minor and distributed. Our aim is to review all empirical research about the existence of SSRL to find confirmation that it is a real construct that can be found in collaborative learning situations. Even though the research is still limited, a review of current empirical evidence is needed to increase conceptual clarity and find rigorous evidence of the phenomena.

Related Concepts of Social Aspects of Regulated Learning

In this section concepts which are closely related to SSRL will be discussed to clarify the differences and connections to SSRL. Vauras and Volet (2013) use an umbrella concept of “interpersonal regulation” to explain the functioning of groups as complex and dynamic situational interplays across different systemic levels (Volet, Vauras, & Salonen, 2009), showing that the study of interpersonal regulation of learning is located at the articulation of individual and social processes (Järvelä et al., 2010). Most conceptualizations of interpersonal regulation of learning research have been inspired by Greeno’s (2006) situative learning framework which integrates the individual and social perspective in “learning in activity” (Greeno, 2006, p. 92) and complements
the interactional focus on participatory processes with a cognitive focus on information processes. In those studies the concept of regulation has been used to describe the social processes the groups use to regulate their joint work on a task (Rogat & Linnenbrink-Garcia, 2011) or the nature and processes of collaborative interactions (Volet, Summers, et al., 2009), and the conceptualization of regulation has been used as productive engagement in collaborative interactions.

Other fields of interest to regulation of learning derive from sociocultural learning theory and the Vygotskian perspective. Concepts such as co-regulation and other-regulation have been used to explain the transitional processes toward self-regulation. According to McCaslin and Hickey (2001), the social system that individuals are part of is assumed to provide affordances and constraints for members to fully engage, to stay at the periphery until ready, or alternatively to avoid engagement. For example, Vauras and colleagues’ studies on socially shared co-regulation (e.g., Salonen, Vauras, & Efklides, 2005; Vauras et al., 2003) point to the social context as the developmental source of self-regulation, and provide support for the contention that teacher scaffolding, involving an emphasis on collaborative learning and opportunities for co-regulation, provided an appropriate context for students to learn and deploy academic regulatory strategies.

The concept of metacognition is also related to the discussion of regulated learning. Dinsmore, Alexander, and Loughlin (2008) have discussed the clarity of meaning of metacognition, self-regulation, and self-regulated learning that are often used in parallel, even though they are different phenomena. The three concepts involve individuals’ monitoring and regulation of their learning, but the articulation of conceptual boundaries between these terms is overlapping. This is the case also when considering metacognition in social aspects of regulated learning. Metacognition researchers have acknowledged the role of peers and more knowledgeable others in mediating and sharing metacognitive knowledge (Brown, 1987; Goos, Galbraith, & Renshaw, 2002). For example, Artz and Armour-Thomas (1992) examined the role of metacognition in small-group mathematical problem-solving by tracking individual students’ cognitive and metacognitive behaviours and
concluded that successful group problem-solving requires the constant interplay of cognitive and metacognitive processes, and individuals competent enough to adapt the metacognitive statements to the process. Recently, researchers have described and operationalized metacognition at peer interaction or group level, and concepts such as socially shared metacognition (Hadwin, Oshige, Gress, & Winne, 2010; Hurme, Merenluoto, & Järvelä, 2009; Iiskala, Vauras, & Lehtinen, 2004) or socially shared metacognitive regulation (Iiskala, Vauras, Lehtinen, & Salonen, 2011) have emerged in reference to regulation of cognitive processes in interactive learning tasks. In these studies, the central idea has been that group members monitor and control each other’s actions to advance the group’s problem-solving.

In this review the studies that have explored socially shared metacognition and socially shared metacognitive regulation have also been included for our analysis. This was done on the basis that SSRL also embraces the cognitive and metacognitive aspects of the group activity and, therefore, the inclusion of these studies offers a more complete picture of the regulation at the group level.

**Identified Challenges in the Field**

In spite of increasing interest in SSRL, three identified challenges emerge in this research area. The first challenge is dealing with conceptual clarity issues. There seem to be considerable differences in how authors and research teams define and operationalize social aspects of self-regulated learning, such as self-regulation, co-regulation, other regulation, high-level co-regulation, shared metacognition, self in social setting regulation, and socially shared regulation, which have been applied in recent theoretical and empirical discussions, and there still seems to be a lack of congruence (e.g., Dinsmore et al., 2008).

Secondly, during the past few years, researchers involved in collaborative learning and CSCL research (Hmelo-Silver & Barrows, 2008; Kirschner & Erkens, 2013) and self-regulated
learning research (Hadwin et al., 2011; Volet, Vauras, et al., 2009; Winne et al., 2013) have worked in parallel to investigate “regulation of learning,” which has resulted in concepts which partly overlap, but still have various conceptual and empirical foci. For example, collaborative learning research and computer-supported collaborative learning research have targeted the general level of regulation of social interactions and knowledge co-construction processes (Saab, 2012). Research on team learning has introduced the concept of task regulation, with a focus on task and domain-specific regulation (Saab, van Joolingen, & van Hout-Wolters, 2012), and the concept of team regulation, focusing on social aspects of team formation (Fransen, Kirschner, & Erkens, 2011; Fransen, Weinberger, & Kirschner, 2013).

The third challenge deals with methodological development. Research methods, which consider the interplay between individual and social processes as they unfold in authentic activity (Greeno, 2006), are still in their infancy. Even though there are new and promising methodological opportunities for studying interpersonal regulation (see Vauras & Volet, 2013), the lack of empirical findings may derive from inadequate methods, which focus either on individual regulatory activities or on social and collaborative interaction processes. For example, Järvelä and Hadwin (2013) have identified that current empirical research is obscure to differentiate shared regulation from shared knowledge construction, mostly because of a lack of methods and analytical techniques for examining individual and collaborative performance outcomes associated with interactional processes. These three challenges will be addressed through the empirical review conducted in this paper.

**Aim and Research Questions**

The aim of this review is to analyze the empirical evidence that supports the theoretical concept of socially shared regulation of learning (SSRL) including the related terms socially shared
metacognition and co-regulation – when used with the purpose of distinguishing among qualitative different types of social regulation in collaborative learning. Our research questions are:

a) What are the main characteristics of SSRL?

b) Can different levels of social regulation be identified (SSRL vs. co-regulation)?

c) What is the relationship of SSRL and other studied learning variables?

d) What are the salient features of SSRL research?

While answering these questions we will identify the following features of SSRL research: type of study, sample, subject or task, type of data, data analysis, procedure, and main results. We will also consider the limitations of the current research and discuss where the field should move next.

**Method**

**Criteria for Inclusion**

Studies from different disciplines were reviewed and included or rejected based on their relevance. First, a study was considered relevance to our research goals if it contained empirical data on the existence of socially shared regulation of learning or related concepts such as socially shared metacognition, shared regulation, or high-level co-regulation. Articles with theoretical arguments were considered if they addressed crucial aspects for the development of the field and their conclusions were based on empirical research. Second, the selection was limited only to printed and peer-reviewed material, such as articles in journals, edited books, research reports, and doctoral dissertations. Third, articles had to be written in English.

**Search Keywords, Databases, and Selection Process**

A first literature search was conducted in October 2012 via the PsycINFO, ERIC, and Thomson Reuters Web of Knowledge databases with no limitation on the year of publication. The
following keywords were used: socially shared regulation (SSRL), socially shared metacognition (SSM), co-regulation, and social regulation. A total of 16 hits were found for SSRL, 8 hits for SSM, 83 hits for co-regulation, and over 5,000 for social regulation. All hits for SSRL and SSM were selected for further exploration, five of them being repeated hits. To obtain hits with a more specific scope in the 5,000 hits group, new searches were performed using co-regulation and social regulation adding the terms: educational psychology and educational research. This reduced the hits to 75 for co-regulation and 145 for social regulation which were analyzed.

In the following step the authors read all the selected abstracts. When a decision could not be taken whether the article had relevant information by reading the abstract alone, the Results and Discussion sections were also read. The main reason for rejecting articles was that they focused on aspects other than our research aim. A significant number of articles addressed aspects of co-regulation in relation to the parental relationship – 59, breastfeeding –, or development at early childhood stages – 23. Therefore, out of the 225 articles from the co-regulation and social regulation search, 5 were selected for a complete reading adding to the 19 articles coming from the search using SSRL and SSM. Finally, out of those 24 selected articles only 10 addressed empirical evidence related to our research aim.

Finally, the “snow-ball” method was used which consists of selecting new articles that could be of interest based on the content and references of the articles already chosen. Using this method six additional articles (three theoretical and three empirical) were included. In February 2013 a new search was conducted using only three of the keywords (socially shared regulation, socially shared metacognition, and co-regulation) finding the same hits. In June 2014 the procedure was repeated and one additional article was included in the review.
Method of Analysis

Due to the fact that the socially shared regulation field has just recently been developed, this review is of a qualitative nature, the approach adopted being narrative content analysis (Dochy, 2006). The main purpose in terms of our analysis is to identify patterns in the research on the field and whether it can be concluded that, based on the existent empirical evidence, socially shared regulation theoretical concepts can be maintained. The possibility of conducting a meta-analysis was excluded as there are a restricted number of studies on the topic and most of them explore the phenomenon using qualitative approaches.

The selected articles were read and coded to explore their relevance for this study aim. Different information was extracted and included in a table (see an abbreviated version in Table 1): type of study, sample, subject/task, method/type of data, data analysis, procedure, results, and evidence on SSRL. Then the information was contrasted to find research patterns, to extract conclusions from the studies, and to judge the direction of future research.

Results

A total of 13 of the 17 selected articles presented empirical data on the existence of SSRL. We next describe these results organized around two sections: evidence on SSRL and features of SSRL.

Evidence on SSRL

All of the empirical articles – excluding the two reviews and the three theoretical papers – show empirical evidence on the characteristics of SSRL (see Table 1). In particular, the results point to a distinguishably collaborative work regulation level called socially shared regulation or socially shared metacognition. Seven of the articles differentiate between co-regulation and SSRL in terms
of the latter being a more collaborative approach to group work (e.g., Volet & Mansfield, 2006), while the other half just characterize SSRL without presenting empirical data about co-regulation or other types of regulation (e.g., Iiskala et al., 2011). When considering different aspects of the evidence on SSRL, we will first present how SSRL is characterized from the reviewed studies, as expressed in our first research question. Second, we will focus on the studies comparing SSRL and co-regulation to answer our second research question. Third, we will analyze what is the interaction of SSRL with other studies’ learning variables. Finally, we will analyze the evidence on the relationship between SSRL and performance. These two last sections will answer our third research question.

Characterizing SSRL

One of the most important features of the SSRL research is to analyze how SSRL happens in collaborative work. It is a common practice for SSRL papers to present examples, mostly verbal interactions, regarding how the groups worked, making visible how the collaborative process developed. The most salient features of SSRL that have been identified are in terms of shared regulatory activities: (a) joint cognitive and metacognitive regulatory strategies (e.g., planning) and (b) group motivational efforts and emotion regulation. We will analyze them next in further details.

The first mentioned feature of SSRL, the use of joint cognitive and metacognitive regulatory strategies, can be found in one of the earliest works in the field, Iiskala et al. (2004). They found evidence on how high-achieving dyads regulated their joint cognitive constructions by shared monitoring of their progress and adapting their performance. The authors analyzed the dyads’ interactions through flowcharts using two types of arrows to differentiate between interindividual metacognitive actions and interindividual cognitive actions. They concluded that interindividual metacognition was an observable phenomenon and that the dyads could monitor and regulate their performance jointly. In a similar fashion, Hurme, Merenluoto, Salonen, and Järvelä (2014) found

Second, the characteristics of shared regulation of motivation and emotion have also been explored. For example, Rogat and Linnenbrink-Garcia (2011) analyzed six groups’ collaboration in three different tasks exploring the role of emotions on SSRL. They included the following categories in their analyses (which had different subcategories): social regulation, positive socioemotional interactions, negative socioemotional interactions, collaborative interactions, and non-collaborative interactions. They concluded that ‘‘Negative socioemotional interactions also appeared to diminish the quality of social regulation’’ (p. 410), the more interactions with negative valence the more problems for the group and for SSRL to occur. Additionally, Volet and Mansfield (2006) found that the two analyzed groups shared regulated motivation and emotion in different fashion depending on the group members personal goals. As an example, they found groups using a contract to motivate members that were not collaborating. Also, Järvelä and Järvenoja (2011) explored shared regulation of motivation in four groups of four members each. They found that the students activated a number of joint motivation regulation strategies (e.g., social reinforcement), which were used and enhanced by the interactions between the group members. Other empirical articles that have addressed emotional and motivational aspects of SSRL are: Volet, Summers, et al. (2009), Grau and Whitebread (2012), indirectly Janssen et al. (2012), and Järvelä et al. (2014).
Evidence of Different Levels of Social Regulation: SSRL Versus Co-Regulation

In this section we analyze the empirical evidence on the comparison of SSRL and co-regulation and if they unfold different collaborative processes. Again, one of the problems is in the use of the terminology (e.g., co-regulation is not always named that way). Five of the empirical articles included in this review show direct empirical evidence of the comparison SSRL and co-regulation. In addition two other articles (DiDonato, 2013; Janssen et al., 2012) show indirect empirical evidence of qualitative different types of social regulation. Next we present in detail the five studies showing the direct evidence.

First, Volet and Mansfield (2006) compared two small groups (size of the groups is not reported) of 3rd year Business students, using interviews and a questionnaire on Students’ Appraisals of Group Assignments (SAGA). They identified two forms of regulation that reflected the differences in the groups that were influenced by the members’ goals for the task.

“Overall, the two small groups of students reflected two distinct mind-sets and related regulatory approaches. Students with negative appraisals and an exclusive focus on performance tended to be more self-centered and saw group assignments in terms of themselves within the group. Consistent with that approach, their regulatory strategies (often maladaptive to the group activity) displayed elements of control, direction and empowerment. In contrast, students with positive appraisals and multiple goals (performance, social and learning) were at least in part, focused on group learning outcomes. They perceived group assignments in terms of group dynamics and their regulatory strategies reflected facilitation, modeling and empowerment” (p. 13).

The most adaptive type of social regulation was named as “self-regulation in cooperation.”

Therefore, there are three main findings for this review research purposes: (a) they identified different levels of social regulation, (b) one of the two levels showed better effects
on the group collaboration, and (c) they explored the effect of different types of goals on the occurrence of SSRL.

Second, Volet, Summers, et al. (2009) identified different levels of co-regulation in 18 second year veterinary students (groups of six members). There are two aspects to remark before we present their findings. First, Volet, Summers, et al. (2009) presented a theoretical framework with four areas (p. 131) based in two continuums: Individual regulation versus Co-regulation, and Low-level knowledge constructions versus High level. Second, what they are referring to as high co-regulation is a close concept to SSRL (e.g., page 131). Their two main conclusions were that (a) it was possible to find evidence of the four areas, meaning that it is possible to differentiate among different types of social regulation, and (b) there is a higher level of co-regulation characterized by the use of joint regulatory activities and higher knowledge construction, which aligns with what other researchers would name SSRL.

Third, Rogat and Linnenbrink-Garcia (2011), of which we have already presented some findings, found differences in the quality of social regulation identifying that positive socioemotional interactions ensured more informal ways of giving feedback and monitor as a group. This produced differences in the groups’ activation of cognitive and behavioural regulation which resulted in high-quality regulation if the groups had interactions with positive valence. In sum, they found evidence for different levels of social regulation and explored the influence of the socioemotional interactions valence in the occurrence of SSRL: if the valence was positive the joint activity increased.

Fourth, Grau and Whitebread (2012) observed the interactions of eight 3rd graders while working in two groups during five sessions. The authors explored the intentionality of actions as categorized in three levels: self-regulation, co-regulation, and shared regulation. The main findings were that (a) individual and social regulation are related, (b) primary students are already able to engage in shared regulation actions, (c) two categories of social regulation could be identified, and
Socially Shared Regulation of Learning

(d) shared regulation led to higher ‘‘talk about essential aspects of the task, such as relevant knowledge’’ (p. 408) which could lead to higher learning.

Fifth, Järvelä et al. (2013) identified three types of SSRL in 18 graduate students working as triads. They did not consider co-regulation, but identified strong, progressive, and weak SSRL processes. The main findings were that (a) groups with different profiles reported different types of learning challenges, (b) there were differences on the type of shared strategies the groups used (more deep strategies in the strong SSRL), and (c) there seems to be a relationship between the type of SSRL and performance.

In sum, these five studies have identified different levels of social regulation, ranging from more collaboration and shared regulation activities, to less joint work and use of strategies. Following Grau and Whitebread (2012) and theoretical proposals (e.g., Hadwin et al., 2011), we will name to the first type SSRL and to the second co-regulation, in the discussion section where these results will be further analyzed.

Evidence on the Interaction of SSRL and Other Learning Variables

There are four variables that have been studied in relation to SSRL: goals (Volet & Mansfield, 2006), feelings of difficulty (Hurme et al., 2009), content processing (Volet, Summers, et al., 2009), and performance (see the next section for the latest research). First, Volet and Mansfield’s (2006) study indicated that the appearance of different types of social regulation (co-regulation and SSRL) was triggered by different goals: co-regulation was triggered by individual and control goals and SSRL by collaborative goals. They explained these results as ‘‘during group activities, personal goals and perceptions of teaching and group contexts interacted dynamically to produce regulation strategies compatible with goal pursuits’’ (Volet & Mansfield, 2006, p. 12).

Nevertheless, there is still a need for more research into how different goals (individual or group-related) might trigger SSRL. Second, Hurme et al. (2009) explored whether engaging in
socially shared regulation helped the students to feel tasks were less difficult for which they found empirical evidence. Their main conclusion is that when students engaged in socially shared metacognition, their experience of difficulty in the task decreased. Volet, Summers, et al. (2009) studied two separate but related concepts: social regulation and content processing. Each had two continuums: social regulation could move between individual self-regulation and group co-regulation, while content processing could move between low-level knowledge acquisition and high-level construct meaning. One of their findings was that high-regulated groups showed a higher level of construct meaning, but they left the door open for interpretation on the causal direction of this relationship: “...it is impossible to ascertain whether participation in high-level co-regulation lead to greater academic performance, or whether higher-performing students had already developed interactional styles that emphasised high-level co-regulation…” (Volet, Summers et al., 2009, p. 141).

**Performance**

Only three studies (Janssen et al., 2012; Järvelä et al., 2013; Volet, Summers, et al., 2009) explored directly whether SSRL produces better learning outcomes, and one additional article shows indirect evidence about this relationship (Grau & Whitebread, 2012). While two of the studies found that the groups showing the highest levels of social regulation – hence SSRL – were those with higher performance (Janssen et al., 2012; Volet, Summers, et al., 2009) the other outlined similar results, but without a detailed discussion on the relationship (Järvelä et al., 2013). The fourth article (Grau & Whitebread, 2012) shows that shared regulation led to higher reflection on the most important features of the task. In sum, these four studies show a relationship between higher levels of social regulation – SSRL – and group performance and learning.
Features of SSRL Research

Next, we analyze features of the SSRL research to offer a clearer picture of the field, in order to answer our fourth research question.

Sample

The reviewed empirical studies include participants from primary education (five studies), middle school (one study), secondary education (one study), and higher education (six studies), therefore there is evidence of SSRL from a broad range of educational levels. Additionally, a line of research has focused on analyzing high-achieving students, mainly dyads, and characterizing how they collaborate (Iiskala et al., 2004, 2011; Vauras et al., 2003).

Subject or Task

The following subjects have been explored: science (one study), business (one study), veterinary physiological principles (one study), history (one study), interdisciplinary project (one study) educational psychology (two studies), and mathematics (six studies). Therefore, the occurrence of SSRL has been explored in relation to a variety of tasks, with a special focus in mathematics. Nevertheless, there is almost no discussion in the existing research about the importance of collaboration for those tasks. In other words, it is not stated why/how collaboration is crucial in those activities, how the collaborative tasks were designed and, therefore, whether SSRL would be crucial in a real classroom setting. In addition there are a significant number of studies conducted using CSCL environments.

Method and Type of Data

The reviewed studies show a clear tendency in the SSRL field toward mixed methods using qualitative data, mostly video-recorded observation data. Only two articles employed a questionnaire in combination with interview (Järvelä & Järvenoja, 2011; Volet & Mansfield, 2006) and another article combined questionnaires and a case study (DiDonato, 2013). Since the majority
of studies have aimed to characterize SSRL, the methodology is based on observation and analysis of cases as, through that data, it is possible to identify how SSRL occurs and what its features are.

In terms of the research design, all the studies were descriptive, with most of them using naturalistic tasks embedded in the curriculum. There were no experiments or quasi-experiments with control groups. The lack of this type of research is an important flaw, but at the same time, now that the SSRL phenomena have been characterized it might be time to start aiming for interventions in either controlled or natural contexts to determine the key factors that promote the appearance of SSRL.

**Data Analysis**

The type of data collected aims for analysis of groups’ interactions by means of sociocultural discourse, verbal transactions, nonverbal communication, and content analysis. The video data was coded and analyzed, aiming to explore the social aspects of the interactions. One example can be found in Iiskala et al.’s (2011) study in which they used different interaction flowcharts and presented two types of arrows, one for interindividual metacognitive actions and another for interindividual cognitive actions, as mentioned earlier. Another example would be the study by Volet, Summers, et al. (2009) based on four categories of social interaction: high-level co-regulation, high-level individual regulation, low-level co-regulation, and low-level individual regulation. These coding systems are representative of how the different researchers conceptualize the socially shared regulation phenomenon.

**Size of the Groups**

One remarkable aspect of SSRL research is the lack of discussion about group size: it has never been discussed in the reviewed literature why one group size is used and not another, or whether there is an ideal number of participants for SSRL to occur. Nevertheless, there is a wide range in the size of the groups in the existing literature (Table 1): dyads (three studies), triads (four),
four members (three), six members (one), and non-stated (one). It can be extracted, then, that SSRL can be identified in the smallest collaboration – a dyad – up to big groups – at least six members.

**Discussion**

The aim of this article was to review the empirical evidence on socially shared regulated learning (SSRL) including socially shared metacognition. We had four research questions: (1) What are the main characteristics of SSRL, (2) Can different levels of social regulation be identified (SSRL vs. co-regulation), (3) What the relationship of SSRL and other learning variables is, and (4) What the salient features of SSRL research are. Next we present our conclusions including limitations of the existent research, limitations of this review and future lines of work.

**Main Characteristics of SSRL**

As conclusion, the empirical articles reviewed characterized SSRL as the joint regulation of cognition, metacognition, motivation, emotion, and behavior. Traces of SSRL can be found in the collaboration of different size groups (from dyads to six-member groups) in the same just mentioned processes that the self-regulation field has explored (e.g., Panadero & Alonso-Tapia, 2014; Zimmerman & Moylan, 2009). In that sense the model introduced by Hadwin et al. (2011; Järvelä & Hadwin, 2013) is a coherent proposal to develop the SSRL field as it comprehends the same processes.

One important aspect for the SSRL field is the lack of a consistent use of the terminology. The two most common terms have been socially shared regulation (e.g., Hadwin et al., 2011; Järvelä et al., 2013) and socially shared metacognition (e.g., Hurme et al., 2009; Iiskala et al., 2004). In some cases these terms have been used interchangeably, and there is a need to consider that both might have been used for purposes other than their original theoretical foci. According to Dinsmore et al. (2008), there are some parallelism between the concepts of self-regulated learning
and metacognition: the first one usually emphasizes, in addition to cognition, the importance of the emotions and motivation, while the second aims more at cognitive processing. Here we propose a similar use: socially shared metacognition could be used when the study covers exclusively aspects of cognition and metacognition and socially shared regulated learning (SSRL) when additionally motivational and emotional aspects are analyzed.

**SSRL Versus Co-Regulation**

Our second research question addressed the possible distinction of two levels of social regulation. Is there empirical evidence that differentiates between co-regulation and SSRL, and what would those differences be? Five of the studies showed direct evidence, and two additional studies indirect evidence. Therefore, it can be maintained that regulation of learning in collaborative situations shows different levels and characteristics. Additionally, the reviewed studies show that there are at least two types of collaborative regulation of learning. First, an unbalanced regulation of learning usually known as co-regulation in which one or more group members regulate other member’s activity. Second, a more balanced approach to collaborative learning in which the group members jointly regulate their shared activity usually known as SSRL or socially shared metacognition. The differences among both types have been described in great detail in the existent research in terms of cognitive, metacognitive, motivational, and emotional aspects.

In theory, Hadwin et al. (2011) argue that learners self-regulate, co-regulate, and share their regulation of learning whenever they work on shared tasks. Instead of investigating co-regulation and SSRL as different phenomena, the roles of self-regulation, co-regulation and SSRL should be considered as built into each other (see e.g., Grau & Whitebread, 2012). The idea that we want to express here is that, even if SSRL seems to have more learning benefits, it can still be the case that co-regulation occurs also in some periods in groups that mostly socially shared regulate (SSRL).
This would be the case as groups progress through different phases on their collaboration and not always SSRL nor will co-regulation happen in isolation.

A clearer use of the terminology is again needed. The most common has been naming co-regulation to the less shared balanced type of regulation, and SSRL to the joint one. The field is still growing, and the terminology could change, but new studies should consider this taxonomy if they are presenting new categories so that the new ones are easily adapted to the existing framework.

**SSRL in Relation to Other Learning Variables**

The results from three studies show the tendency for SSRL to increase group performance and a fourth study indirectly shows evidence also for individual learning. This is a crucial finding, as use of more learning strategies or self-regulation does not always lead to higher performance (e.g., Panadero, Alonso-Tapia, & Huertas, 2012; Panadero, Alonso-Tapia, & Reche, 2013), and therefore SSRL could have counter-effects which would have not yet been identified. Nevertheless, the number of studies that have explored the effect of SSRL on performance is surprisingly low. We consider it crucial for the incoming research to provide more evidence on this effect, to establish whether SSRL promotes higher performance in group tasks. There is then a need to clarify whether socially shared regulation always benefits learning and/or under what circumstances this happens. Therefore, our call for is that future research should include measures of performance as a way to validate the relevance of SSRL for students’ learning.

With regard to the other three learning variables that have been explored (goals, feelings of difficulty, and content processing) it is precarious to extract conclusions as each of them has only been studied once. Three aspects seem to us of major importance in the future research. First, exploring how the individual goals that each member brings to the group affect the occurrence of SSRL, in line with Volet and Mansfield (2006) research. Second, what type of shared goals groups construct and if the individual goals taxonomy applies to the group work situations (e.g.,
performance, avoidance, and learning). Third, the socioemotional variables seem to have a role in SSRL (Järvelä et al., 2013), but has not been much investigated.

**Salient Features of the SSRL Research**

The SSRL research has used descriptive data. The existing studies have mainly explored the existence and characteristics of socially shared regulation, and for that purpose, observing what groups actually do is a key research method. The aim of these qualitative approaches is to explore social interactions and exchanges, and that is the type of data that supports those analyses. These methodological advances to conduct research on interpersonal regulation (see Volet & Vauras, 2013) have potential for unfolding the individual and social interaction processes of regulation in learning. However, there is a challenge in developing validated instruments and analytical techniques to move the field forward using methods that could answer research questions other than those already answered. Future research should conduct experiments or quasi-experiments because without control groups it is difficult to determine (a) the real learning gains, (b) how to better differentiate SSRL from co-regulation, and (c) the key factors that trigger SSRL occurrence.

Compared to the traditional self-regulated learning research (Boekaerts & Corno, 2005), a low number of self-report tools have been applied in SSRL research. Only two questionnaires have been used in SSRL research so far: SAGA (Volet & Mansfield, 2006) and AIRE (Järvenoja, Volet, & Järvelä, 2012). Nevertheless, even though self-reports present some limitations when used to measure students’ strategy use, they could be valuable to add information to the process data which is the main information collected in SSRL. For example, questionnaires could be used to ask the students about their collaborative skills perceptions of group work and to explore what aspects they consider fundamental to engage SSRL. In sum, at this point, self-report data could amplify our understanding of SSRL and serve to answer new research questions.
Limitations of This Review

One limitation is that the SSRL is a new field. The first study dated to 2003. Even if since 2009 there has been a considerable increase in the number of publications, there is still a low number of studies exploring SSRL. Therefore, our conclusions should be put into context of future studies to come.

Another limitation is the nature of the empirical evidence available. Most of the studies are descriptive in essence. This lack of empirical research impedes causal attributions, and when using correlational data, as the one analyzed here, the conclusions have to be done with care. Therefore, there is still a need for more research especially using experimental designs to ensure controlled results.

Practical Implications

The main implication for teaching purposes from this review is that teachers should promote learning environments leading to SSRL collaborative work. Unfortunately, the environmental and pedagogical factors that trigger SSRL have not been explored in enough details yet. Nevertheless, we will present some ideas that could be beneficial for SSRL occurrence. First, teachers should encourage working groups to have shared responsibility for their actions and equal power relationships. If one student takes the role of leader with negative consequences (e.g., ordering to the other group members what to do) there would be less shared decisions. Second, teachers should provide opportunities for the groups to plan, monitor, and evaluate their work (Järvelä et al., 2014). This can be done using tools (e.g., rubrics), modeling the groups and allocating time for the groups to plan and evaluate their work before and after the performance. Third, teachers should point out that the group processes (e.g., members’ motivation) are also part of the activity. Giving attention to these types of processes would make them more salient and students would start paying attention not only to the final outcome but also to the collaboration itself.
First General Line of Future Research: Self-Regulation at the Personal Level and Other Individual Characteristics

As Winne, Hadwin, and Gress (2010) claim, little attention has been paid in the CSCL research to the resources each group member brings to a collaboration: prior knowledge, task-relevant information and cognitive processes. This claim is also transferable to the current situation in SSRL research. The studies analyzed in this review (except for Grau & Whitebread, 2012) do not explore how different individual variables might promote or disturb the occurrence of SSRL.

Among these, it seems of special relevance to explore how individual self-regulation skills affect the collaborative work, thus SSRL. For example, can SSRL emerge in groups in which students have low individual self-regulation? Our claim is that for SSRL to fully emerge, the group members need to have advanced self-regulation skills, as it is more difficult to regulate at the group level than at the individual one (Winne et al., 2013). Actually, there are a number of SSRL studies in which the sample was composed of advanced students (e.g., Vauras et al., 2003), therefore this seems to be an important area for future research.

Another important individual characteristic for SSRL is the group members’ individual social skills and how this affects the collaboration. Previous research on the topic has already pointed out that students perceived as leaders might contribute to different types of group regulation (Salonen et al., 2005). Also group dynamics of collaboration (Salomon & Globerson, 1989) should be considered, since if one student feels and is perceived as more of an expert, SSRL might not happen, as the other group members might consider it better to follow the ‘‘expert’s’’ guidance. This point was approached theoretically by Salonen et al. (2005) under the name of asymmetry: ‘‘Our study with collaborating peers provides some evidence, but peer relations are different from teacher-student relations, where there is asymmetry in social status in the group as well as in the cognitive and motivational background’’ (p. 206).
In conclusion, the main idea that we want to transmit here is that, even if the group is a separate entity different from the students working in isolation, it is also the sum of all its members (Dillenbourg, 1999). Looking at the different members’ individual characteristics can be crucial to better understand how and when SSRL happens. For example, aspects such as friendship, emotional security, or interdependence, might be crucial for the activation of SSRL strategies within the groups. Therefore, looking not only at what happens during the collaboration but also what the students bring to the interaction will help us clarify how to promote SSRL.

Second General Lines of Future Research: The Importance of the Learning Task and Developing Interventions

There are two other aspects that SSRL researchers could explore in more detail. First, there is a lack of argumentation regarding why the different tasks were chosen for the studies. Actually, the tasks used varied from computer-supported collaborative learning to peer learning tasks or group tasks. It is not clear in these studies whether the task definition was such that the students had a real need to collaborate and share their ideas (Dillenbourg, 1999). The task type and the degree of coordination of shared activities (Barron, 2000) is crucial if we want to promote SSRL. Therefore, argumentation about the type of task chosen is needed in future SSRL research. A second aspect is the implementation of interventions to enhance SSRL. The current research has characterized the phenomenon, but there are no studies implementing an intervention to promote SSRL and comparing with a control group. With the findings from this review in mind, implementing SSRL interventions would be a positive step to increase groups’ performance. Another step is to conduct interventions that scaffold and support dynamics that promote SSRL. This has potential especially in the field of CSCL, since group processes are at the center of CSCL and the opportunities to support regulatory processes exist in technology that is already available (Järvelä et al., 2014).
Third General Line of Research: On the Comparison of SSRL Versus Co-Regulation Including Developmental Aspects

This review indicates that there are different types of social regulation that occur in collaborative learning (Hadwin et al., 2011). Future research needs to continue clarifying what are the characteristics of each SSRL and co-regulation, in addition to the ones presented here. For this comparison the developmental aspects of the students should be taken into account, not only age but also the expertise in the task. First, more clarification is needed if and how different group age students shared their regulation. In the studies reviewed here there is a big range in age groups but there is not a developmental approach explaining what the role of age is for SSRL. Second, it could be the case that students need to have some expertise on the task at hands or previous experience in collaborative tasks for SSRL to occur. Third, more ambitious efforts need to be undertaken to reveal what could be the impact of individual development of self-regulatory skills on the occurrence of SSRL when working in teams.

Fourth General Line of Research: A Call for Theoretical Clarification

There are two main areas where more conceptual clarification is needed. First, SSRL scholars should address in more depth what are the implications of Vygotsky’s and sociocultural research works for SSRL. Even if this discussion goes beyond the scope of most of SSRL empirical papers the field would benefit from establishing the connections between SSRL and Vygotsky’s work. One of the benefits could be a better understanding of the developmental aspects needed for optimal SSRL. Second, a more thoughtful use of the terms socially shared metacognition and socially shared regulation would also help on the development of the field as has already been argued in the Discussion section.
General Conclusions

Based on the empirical evidence available our recommendation is that future lines of research should not focus exclusively on characterizing and describing SSRL but, as explained above, on advancing the field in three other dimensions: first, exploring the best conditions and different factors to promote SSRL. We now know how social interactions happen when SSRL occurs, but there is a need for interventions to promote it so that we can implement it in general learning contexts (e.g., bigger classroom groups or in computer supported collaborative learning settings). Promising results have been found regarding the use of technology tools in prompting self-regulation (Winne et al., 2006) and co-regulation (Azevedo, Cromley, Winters, Moos, & Greene, 2005), but it is still rare for tools to be leveraged in SSRL regulation support (Järvelä & Hadwin, 2013; Järvelä et al., 2014).

Second, there is a need to clarify the role of co-regulation in SSRL. The empirical research shows evidence that co-regulation is built in SSRL (e.g., Grau & Whitebread, 2012), but more is needed to complete our understanding of the relationship between these two types of regulation. It seems that instead of being an on/off type of relationship it is more complex and even subordinated. There may be at least two variables that could explain how groups move between co-regulation and SSRL: group dynamics and level of expertise (asymmetry). Therefore, future research needs to address a more in-depth understanding of the dual interaction of co-regulation and SSRL, what are the benefits of each one and under which circumstances, and what triggers one or the other.

Third, more research is needed on aspects of groups’ characteristics. The current research on SSRL has not addressed in detail questions regarding size of groups, characteristics of members (e.g., SRL skills), individual social abilities, etc.

In conclusion, the empirical evidence accumulated shows that SSRL is a real phenomenon that occurs within collaborative groups in joint learning situations. Even though the field is young and growing a number of important features of SSRL have been already explored. Nevertheless,
there is still a long road ahead to continue discovering aspects of SSRL and how to create the best learning environments to promote SSRL in collaborative learning situations.

References

(References marked with an * were included as part of the empirical review)


* Grau, V., & Whitebread, D. (2012). Self and social regulation of learning during collaborative activities in the classroom: The interplay of individual and group cognition. *Learning and Instruction, 22*(6), 401-412. doi: 10.1016/j.learninstruc.2012.03.003


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**Table 1**

**Summary studies on shared regulation**

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Sample</th>
<th>Task</th>
<th>Type of data</th>
<th>Main conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iiskala, Vauras &amp; Lehtinen (2004)</td>
<td>Empirical</td>
<td>Four 4th grade high-achieving pairs (Finland)</td>
<td>Mathematics (Quest of the Silver Owl)</td>
<td>Observational data (video)</td>
<td>Studied shared metacognition adding the idea of mutuality, simultaneity and sharing.</td>
</tr>
<tr>
<td>Salonen, Vauras &amp; Efklides (2005)</td>
<td>Theoretical paper</td>
<td>Two studies conducted on the topic (Finland)</td>
<td>Theoretical reflection</td>
<td></td>
<td>Different aspects of socially shared metacognition are presented: scaffolding and how to make it optimal, perceptions of students’ metacognitive experiences, among others.</td>
</tr>
<tr>
<td>Volet &amp; Mansfield (2006)</td>
<td>Empirical</td>
<td>Eighteen 3rd year Business students. Unknown members per group (Australia)</td>
<td>Business small group assignment.</td>
<td>Interview and questionnaire</td>
<td>Explored the role of different goals and their effects on co-regulation vs. SSRL.</td>
</tr>
<tr>
<td>Hurme, Merenluoto &amp; Järvelä (2009)</td>
<td>Descriptive exploratory study</td>
<td>Two triads of pre-service primary teachers. (Finland)</td>
<td>Mathematics</td>
<td>Descriptive. Through the interactions in WorkMate (a CSCL tool)</td>
<td>Characterization of the SSRL in combination with feelings of difficulty.</td>
</tr>
<tr>
<td>Volet, Sammers &amp; Thurman (2009)</td>
<td>Empirical</td>
<td>18 second-year veterinary science students’ (groups of six) (Australia)</td>
<td>Physiological principles applied to veterinary cases.</td>
<td>Case study (observational procedures) embedded in real classrooms. Video data collection and analysis.</td>
<td>Explored different levels of collaborative work based in four-pole axis matrix: social regulation (SSRL vs. co-regulation) and content processing (low-level knowledge acquisition vs. high-level construct meaning).</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Type</td>
<td>Description</td>
<td>Methodology</td>
<td>Findings/Conclusion</td>
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<tr>
<td>Castelló, Bañales &amp; Vega-López (2010)</td>
<td>Theoretical review</td>
<td>Different theories driven interventions on the writing field</td>
<td>Narrative review</td>
<td>Identified four approaches to the study of the writing process: (a) cognitive perspective starting with Hayes and Flower work; (b) Socio-cognitive perspective: ideas from Zimmerman including motivation and emotion; (c) Sociocultural perspective: writing is a social process that develops within a community; and (d) Socially shared perspective: taking ideas from Hadwin and Järvelä.</td>
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<tr>
<td>Hadwin, Järvelä &amp; Miller (2011)</td>
<td>Theoretical chapter</td>
<td>Mathematical word problems</td>
<td>Theoretical reflection</td>
<td>Outlined the differences between individual SRL, co-regulation, and socially shared regulation. The key feature that distinguishes SSRL from co-regulation is that the group, as a unit, shares convergent regulation of the team activity through planning, monitoring, evaluation, and regulating the motivation, emotion, cognition, and behavior.</td>
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<tr>
<td>Järvelä &amp; Järvenoja (2011)</td>
<td>Empirical</td>
<td>Sixteen first year graduate from an educational course. Four members groups. (Finland)</td>
<td>Educational psychology</td>
<td>Presented evidence that SSRL emerges when students collaborate and make efforts to regulate their learning and engagement.</td>
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<tr>
<td>Rogat &amp; Linnenbrink-Garcia (2011)</td>
<td>Empirical</td>
<td>Six four-member groups of sixth-graders (USA)</td>
<td>Mathematics</td>
<td>Explored different levels of social regulation linked to co-regulation and SSRL.</td>
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<tr>
<td>Grau &amp; Whitebread (2012)</td>
<td>Descriptive exploratory study</td>
<td>8 third grade working in four members groups. (UK)</td>
<td>Science subject.</td>
<td>Compared SSRL vs. co-regulation presenting the most salient features of both.</td>
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<tr>
<td>Janssen, Erkens, Kirschner, &amp; Kanselaar, (2012)</td>
<td>Empirical</td>
<td>310 secondary education students (15-18 years), 5th year of the pre-university track. Mostly triads but also pairs and four-member groups. (Netherland)</td>
<td>History tasks. Virtual Collaborative Research Institute (VCRI) tool</td>
<td>Cases studies</td>
<td>It was found that groups regulated their task performance on a regular basis mostly planning the task (19.51%) and monitoring task progress (14.03). Discussing information and regulation of task-related activities did not predict group performance. There is a positive effect of regulation of social activities on group performance.</td>
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<td>DiDonato (2013)</td>
<td>Empirical descriptive</td>
<td>64 middle school students (Ages 12-14). Unknown group number. (USA)</td>
<td>Interdisciplinary project</td>
<td>Descriptive. Quantitative: questionnaires &amp; qualitative: case analysis.</td>
<td>Co-regulation as measured by the questionnaire mediated the use of SRL in the group. The case study data showed that the group had strong other-regulation that most probably helped to achieve the task goals. There was also shared regulation but less frequently.</td>
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<tr>
<td>Järvelä, Järvenoja, Malmberg &amp; Hadwin (2013)</td>
<td>Descriptive exploratory study</td>
<td>18 graduate students in a Master's program working in triads (Finland)</td>
<td>Educational pysch. course</td>
<td>Descriptive. Quantitative data using nStudy</td>
<td>Identified three types of SSR: strong, progressive, and weak. They also explored the relationship of SSR and performance, resulting in three levels of performance (strong, improvers, and weak).</td>
</tr>
<tr>
<td>Hurme, Merenluoto, Salonen &amp; Järvelä (sent for publication)</td>
<td>Descriptive exploratory study</td>
<td>45 pre-service primary teachers (working in triads) (Finland)</td>
<td>Mathematics</td>
<td>Descriptive. Through the interactions in WorkMate (a CSCL tool). And quantitative using self-reports.</td>
<td>Characterization of the socially shared metacognition phenomena.</td>
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</table>