

Cite as:

Panadero, E., Jonsson, A., & Strijbos, J. W. (2016). Scaffolding self-regulated learning through self-assessment and peer assessment: Guidelines for classroom implementation. In D. Laveault & L. Allal (Eds.), *Assessment for Learning: Meeting the challenge of implementation*.

Chapter 18

Scaffolding Self-regulated Learning through Self-assessment and Peer Assessment: Guidelines for classroom implementation

Ernesto Panadero, Anders Jonsson and Jan-Willem Strijbos

Abstract Although the focus on feedback and student involvement in Assessment for Learning (AfL) appears to align very well with theories of Self-Regulated Learning (SRL), and also seems to be the main reason for many researchers' interest in formative assessment, the actual relationship between AfL and SRL is an issue of debate. In this chapter, we therefore explore the relationship between two AfL practices, namely, self-assessment and peer assessment, and SRL. These AfL practices emphasize student feedback and are both thought to increase student involvement in assessment. They also have evident connections to SRL models of self-regulation and co-regulation. Special attention is given to strategies for the implementation of peer and self-assessment in the classroom. In particular, guidelines are presented on teachers' mediating and modeling role in peer and self-assessment, as well as on how to use formative assessment instruments, such as rubrics, scripts and prompts, in order to promote student involvement in assessment.

1 Introduction

The promotion of students' active involvement in assessment is an integral part of Assessment for Learning (AfL). Still, in studies on the implementation of AfL it has been noted that teachers, when given the choice, may choose *not* to involve students in the assessment process. Instead they may focus primarily on other AfL practices, such as clarifying and sharing assessment criteria, designing learning situations and providing external feedback (Jonsson et al. 2015). This is problematic, not only because the AfL practices then run the risk of becoming more teacher- and teaching-centered, rather than student- and learning-centered; students may thus lose an important opportunity to develop the capacity to self-regulate their learning.

The relationship between AfL and Self-Regulated Learning (SRL) has been a topic of interest and debate among AfL researchers since the beginning of the field. For instance, the seminal review by Black and Wiliam (1998) included articles exploring this relationship (e.g., the review by Butler and Winne (1995) that connects SRL and feedback). More recently, Nicol and McFarlane-Dick (2006) proposed seven principles of 'good feedback practice' that are thought to promote SRL. Likewise, Clark (2012) discussed, from a theoretical point of view, how formative feedback may actualize and reinforce SRL strategies among students. These contributions, however, give insufficient attention to what we know about SRL theories and models (Panadero and Alonso-Tapia 2013; Zimmerman and Schunk, 2001). Most importantly, they do not explain in any detail how AfL may affect the different components of the SRL processes. This means that the relationship between AfL and SRL is more often assumed than explicitly supported by findings from empirical research.

In this chapter, we will therefore present research that has empirically investigated the relationship between AfL practices and SRL. Specifically, we will start from a key SRL model and explore how its components may be affected by two AfL practices that, in our view, are highly important in the context of SRL, namely self-assessment (SA) and peer assessment (PA). By presenting examples from research on SA and PA, we will illustrate what is currently known about these practices in relation to SRL. From the same research

base, we will also present recommendations on how to facilitate the implementation of SA and PA in the classroom.

2 A brief overview of SRL

According to Zimmerman (2000), SRL can be defined as ‘self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals’ (p. 14). SRL has become one of the main theories in educational psychology and it is often cited as the core competence required for ‘learning to learn’ (Zimmerman and Schunk 2011). There are a number of SRL models from different theoretical perspectives (Panadero and Alonso-Tapia 2014), but they all highlight the following common characteristics of SRL as: (a) a cyclical process, (b) comprised of cognition, metacognition, motivation and emotion, and (c) a set of skills that can be developed and learned.

One of the primary reasons for the growing interest in SRL research is the impact that SRL has on student learning and performance. A number of studies have shown that SRL skills are important for the success of students (Dignath and Büttner 2008). Also, acquiring SRL skills during one’s education may impact subsequent ‘lifelong learning’ (e.g., de la Harpe and Radloff 2000).

There is an increasing amount of evidence that SRL skills can be learned, and even taught as a set of generic skills. A number of researchers have conducted interventions in classrooms in order to develop students’ SRL skills, either working with the students (Dignath and Büttner 2008) and/or with the teachers (Kramarski and Michalsky 2009). Working with teachers by including them in the interventions is crucial since they have an important role in shaping the classroom culture (Boekaerts and Corno 2005). One of the critical aspects in this respect is classroom assessment. Depending on the existing assessment culture, students are likely to make use of different approaches to learning, focusing mainly on strategies for either deep or surface learning (e.g., Segers et al. 2006), which highlights the interplay of classroom assessment practices (AfL) and student learning strategies (e.g., deep vs. surface learning, SRL).

3 The Relationship between AfL and SRL

Some of the earliest work on the relationship between AfL and SRL dates back to the 1990s. Butler and Winne (1995) analyzed the relationship between feedback and SRL, establishing the distinction between internal and external feedback. This is important because it emphasizes that teachers’ external feedback impacts students’ development of SRL skills via their internal feedback. In their review of classroom assessment, Black and Wiliam (1998) explicitly connected SRL to classroom assessment and formative assessment practices, thus laying the foundation for what was later to become known as AfL.

Whereas previous research on SRL was more theoretically oriented as compared to research on AfL, which tended to be more practical and classroom focused, there has been a shift of late in the literature towards a more balanced use of both theoretical contributions and empirical data in both fields (e.g., Andrade and Brookhart 2014; Panadero 2011; Winne 2014). As pointed out by Wiliam (2014), a benefit of the SRL perspective for AfL is that it allows practical classroom techniques to be theorized and more easily shared; at the same time, AfL practices may enhance students’ SRL skills by providing students with the opportunity to practice these skills and by providing (external) feedback that can support

student learning. Two AfL practices that can affect SRL – through their emphasis on student involvement and feedback, are SA and PA. In the next two sections, we therefore analyze the relationship between SA and SRL theory – more specifically the model proposed by Zimmerman and Moylan (2009) – and the relationship between PA and co-regulation or socially shared regulation of learning (Hadwin et al. 2011; McCaslin 2009). In addition to establishing theoretical connections, we analyze empirical evidence that supports such connections.

4 Self-Assessment

4.1 Definition

According to the frequently cited definition of Boud and Falchikov (1989), SA occurs when students make ‘judgements about their own learning, particularly about their achievements and the outcomes of their learning’ (p. 529). SA may involve a wide range of activities, from asking students to grade their own work without further reflection (i.e., self-grading/self-marking), at one end of the spectrum, to having them make comprehensive analyses of their own performance on complex tasks (e.g., Kostons et al., 2012), at the other end. SA has been shown to have positive effects on student performance with a median effect-size (Cohen’s *d*) between 0.40 and 0.45 (Brown and Harris 2013), which is consistent with the effects reported by Boud and Falchikov (1989).

4.2 SA as an Instructional Approach and an SRL Component

There seems to be two lines of SA research: one coming from a more teacher-centered perspective linked to AfL and the other coming from the SRL literature (Olina and Sullivan 2004; Panadero and Alonso-Tapia 2013). Whereas SRL research is based on an ‘internal perspective’ of SA and focuses primarily on the ‘inner processes’ and on self-regulation as a generic skill, AfL research considers SA often as a context-dependent skill that is not easily transferable across different situations or subjects. Although these differences have become less pronounced in recent years (e.g., Kostons et al. 2012), some researchers (e.g. Panadero and Alonso-Tapia, 2013) still argue that it is important to differentiate between AfL and SRL approaches to SA and how they emphasize different aspects of SA because this will support a more coherent use of AfL practices based on at their enhancement of SRL.

Interestingly, the potential of merging the AfL and the SRL approaches with respect to SA did not attract much attention until recently when there has been an increased interest in this topic (Andrade and Brookhart 2014; Kostons et al. 2012; Panadero and Alonso-Tapia 2013). As proposed by Wiliam (2014), research in this area needs to build on the strengths of each of these approaches in order to bridge theory and practice. The main idea is that when a teacher provides the space for working with SA in his/her classroom, this can improve students’ capacity to self-assess their own work and thereby improve their SRL skills.

4.3 Zimmerman’s SRL Model and SA

Zimmerman’s cyclical model of self-regulation is one of the most cited models in the SRL literature (Panadero and Alonso-Tapia 2014; Zimmerman 2013). Zimmerman’s model (see Zimmerman and Moylan 2009) consists of three cyclical phases: (a) *Forethought* which includes task analysis and self-motivation beliefs, (b) *Performance* which includes self-control and self-observation processes, and (c) *Self-reflection* which includes self-judgment

and self-reaction. It is important to note that the different SRL phases are not closed and have a recursive nature, meaning that the self-reflection phase results will have effects in the forethought phase the next time the student performs the task. SA can take place during all phases of the model (Panadero and Alonso-Tapia 2013). In the next sections we discuss the phases of the Zimmerman model in relation to AfL research.

4.3.1 Forethought Phase

Researchers often recommend preparing for SA as early as possible when planning an activity (Andrade and Valtcheva 2009; Panadero and Alonso-Tapia 2013; Topping 2003). As visualized in the forethought phase of the model, students analyze the task, set goals, and identify which strategies are needed. According to research in AfL, it may be beneficial for teachers to discuss the assessment criteria with the students before starting the activity. Students can then use these criteria to set more realistic goals for the activity and to evaluate their work both during the process and afterwards (Panadero and Alonso-Tapia, 2013). If the students do not have access to the criteria until after they have performed the task, they are likely to discover some aspects of their performance that they should have included from the beginning, but by then it might already be too late. A particular branch of AfL research emphasizing the need for clear criteria is research on scoring rubrics used by students (Jonsson and Svingby 2007; Panadero and Jonsson 2013). In this line of research, it is a common recommendation to provide the students with explicit assessment criteria before performing the task, and in some cases even to negotiate the criteria with the students. With the aid of explicit criteria, students are thought to become more motivated to perform the task and also able to set more realistic goals for themselves (Andrade and Du 2005; Jonsson 2014; Panadero and Alonso-Tapia 2013).

4.3.2. Performance Phase

During the performance phase, students have to assess how well they are progressing towards the goals they established in the planning phase. This activity is known as ‘metacognitive monitoring’ in the model, as it involves reflection on one’s own work. Emotional aspects of performance are also considered (for example, interest incentives which are related to motivation and emotion). During this phase there are different ways in which AfL practices may influence the SRL cycle. First, if assessment criteria are known to the students at the beginning of the task, it will be easier for them to check whether they are ‘on track’. Second, if students know that they will receive formative feedback (i.e., feedback that is aimed at enhancing their learning), they are less likely to feel anxious or stressed during the performance, as they know there will be opportunities to improve. And, third, students who have become used to receiving detailed feedback will likely be more motivated to ask for help if they get stuck and to activate SRL strategies in order to overcome the challenges encountered.

4.3.3 Self-Reflection Phase

During the self-reflection phase, the students’ main focus is on evaluating their own work (which is facilitated via external and/or internal feedback; Butler and Winne 1995) and they make inferences about the causes for success or failure. There are several ways in which AfL practices might impact this phase. First, with access to explicit assessment criteria students may make a more valid assessment of their work as they know the key aspects expected in the final product. Second, they may thus make more accurate interpretations of reasons for

success or failure. When students understand the reasons for a weak performance, they can more easily attribute their level of performance to factors that they can potentially influence (Panadero and Alonso-Tapia 2013; Zimmerman and Moylan 2009). In this situation, students' reactions are less likely to affect self-image, motivation and learning strategies in a way that is detrimental for their learning. Third, since the feedback in AfL practices is oriented towards promoting learning, students can use the feedback in order to improve their performance, especially if they are given the opportunity to revise their work. This is one of the key findings in the research on students' use of feedback: while it is well established that many students do not use the feedback they receive, most students do so if the use of feedback is an integrated part of instruction, which allows students to revise their work or to perform a similar task assessed with the same criteria (Jonsson 2013).

4.4 Empirical Evidence of the Relationship between SA and SRL

A significant number of papers advocate a theoretical relationship between SA and SRL (Lan 1998; Paris and Paris 2001) and even some empirical papers try to establish such a relationship based on teachers' and students' perceptions of assessment practices (Harris and Brown 2013; Tan 2012). However, studies with experimental or quasi-experimental designs, where the effects of SA treatments on SRL are investigated and compared against control groups, are quite scarce. Nevertheless, several studies do exist and they show the benefits of implementing SA interventions (as proposed by AfL) for the enhancement of SRL skills. Two lines of research in this area can be distinguished.

In the first line of research, Kostons et al. (2012) explored two aspects of SA with secondary school students (age $M = 15.23$). First, they investigated whether SA skills and 'task-selection accuracy' (i.e., the extent to which students are able to choose a task according to their own capability) could be acquired either by observing a model performing the task or by repeated task-practice. Second, they investigated if SA training would have an impact on students' SRL skills. One of their main findings was that students could be trained in SA via observing a model performing the task. Furthermore, students who were trained to self-assess in combination with training in task-selection accuracy outperformed the control group on SRL-effectiveness, as measured by student responses on mental effort and SA rating scales. However, only students who observed a model (and not students who were exposed to repeated training) outperformed the control group on SA accuracy. The results from this study have important implications for the field. First and foremost, SA training may indeed enhance the use of SRL skills. Another important implication, although this may seem obvious, is that not all SA interventions have the same effect. Furthermore, the results indicate that the accuracy of student SA may not be vital for improving students' SRL skills through SA training.

In the second line of research, Panadero and colleagues explored in a series of studies on how SA, as promoted via scripts and rubrics, influenced the use of SRL skills (Panadero 2011). A script is a list of specific questions, structured in steps that model how an expert in the field would approach a complex task from beginning to end. Scripts can be used as way to scaffold students' strategies and thinking when solving complex tasks. Rubrics are an assessment instrument that specifies which aspects of student performance are to be assessed and provides descriptions of different levels of quality for each aspect. An essential difference between scripts and rubrics is that scripts are designed as instructional resources, whereas rubrics are primarily assessment instruments. Rubrics therefore do not include instructions

about how to solve a task, but stress how to *evaluate* either the process or the product (or both).

In the first of their studies with secondary school students (age $M = 15.9$), Panadero et al. (2012) found that the level of SRL in the script group, as measured through think-aloud protocols, was higher than in the rubric and control groups. Additionally, the rubric group showed a higher level of SRL than the control group. One important conclusion is therefore that SA training via either a rubric or a script may enhance the use of SRL strategies. The self-reported SRL data did not show significant differences¹: students reported similar levels of SRL, while in practice there were significant differences in their use of SRL strategies.

The comparison script vs. rubric was further analyzed in two subsequent studies using only self-reported data. In Panadero et al. (2013) it was found that pre-service teachers using scripts scored higher on 'Learning SRL' (positive type of SRL), whereas students using rubrics decreased their scores on 'Performance/avoidance SRL' (negative type of SRL). In a similar fashion, Panadero et al. (2014a) found that first year psychology students who used rubrics decreased Learning SRL, whereas their use of scripts increased Performance/avoidance SRL. Therefore, scripts seem to have a positive effect on Learning SRL, enhancing it more than do rubrics, while rubrics seem to have a positive effect on Performance/avoidance SRL, decreasing it more than do scripts.

Finally, Panadero and Romero (2014) compared the effect of a 'baseline SA condition' (i.e., asking the students to self-assess their work, but without providing any instrument to facilitate the SA) to a 'rubric referenced SA condition' for pre-service teachers. The rubric group scored higher on Learning SRL and formulated more accurate SA, as compared to the baseline condition. However, the students in the rubric group also reported higher levels of stress while performing the task. The decrease in Performance/avoidance SRL was larger in the baseline SA condition, but the Performance/avoidance SRL scores of the rubric group decreased significantly as well.

Two main conclusions can be drawn from the work by Panadero and colleagues. First, promoting SA can increase the use of SRL strategies. Second, different instruments, such as rubrics and scripts, may have different effects on student SRL: scripts seem to increase Learning SRL, while rubrics may decrease Performance/avoidance SRL, which is often detrimental for learning.

4.5 The Role of the Teacher in Promoting SA: Guidelines for Implementation

The teacher's role in facilitating students' SA and in giving opportunities for practice has been emphasized in AfL research. In light of the large number of recommendations in the literature on implementation of SA in classrooms, we will highlight some guidelines that we consider to have special relevance for the development of SRL. Andrade and Valtcheva (2009) and Ross (2006) proposed several recommendations regarding instructional conditions to support SA. The following list combines their recommendations:

1. Define the criteria by which students assess their work
2. Teach students how to apply the criteria

¹There were significant differences on the performance/avoidance SRL scale but it was in interaction with the type of feedback and type of instructions. Therefore the effect occurred in interaction with other variables that will not be discussed here.

3. Give students feedback on their self-assessments
4. Give students help in using self-assessment data to improve performance
5. Provide sufficient time for revision after self-assessment
6. Do not turn self-assessment into self-evaluation by counting it toward a grade.

The sixth recommendation concerns a complex and controversial issue, namely, the use of SA for summative purposes. On the one hand, students' assessment of their own work may be evaluated and taken into consideration by a teacher when grading student performance. This is done by a number of teachers (Panadero et al. 2014b) and some teachers (in higher education) consider SA to be a potentially more valid measure of students' achievement than their results on traditional exams (Tan 2012). On the other hand, using students' self-attributed grades for summative purposes may encourage students to make strategic choices in order to maximize their chances of achieving a higher grade, such as overestimating their performance (Boud and Falchikov 1989), instead of focusing on learning and improving their SA and SRL skills.

With respect to teachers' preparation as facilitators of SA, Panadero et al. (2014b) found that the strongest predictors for teachers' use of SA in their classroom were: (a) previous positive experience with SA, (b) endorsement of the educational advantages of SA (detection and correction of problems, saving time for the teacher, improvement of students' learning by using SA), and (c) previous training in assessment courses. These three aspects could be enhanced by means of 'Teacher Learning Communities' (TLCs), which have been suggested as a means to facilitate changes in the deep-rooted practices and habits of 'traditional assessment' (William and Thompson 2007). The use of professional learning communities for such purposes received further support by an overview of research on professional development and teacher learning by Borko (2004). She concluded that there is evidence suggesting that strong professional learning communities can not only foster teacher learning and instructional improvement, but also contribute to school reform. Organizing such groups may therefore aid teachers in implementing new instructional practices, such as SA. It should be noted, however, that the development of teacher communities may be difficult and time-consuming.

5 Peer Assessment

5.1 PA Definition

PA is 'an arrangement in which individuals consider the amount, level, value, worth, quality or success of the products or outcomes of learning of peers of similar status' (Topping 1998, p. 250). However, there is a large variety of PA practices that differ in terms of (a) purpose (summative vs. formative), (b) format (marking/rating with or without comments/feedback), and (c) degree of interaction between the assessor and assessee (e.g., PA of individual performance vs. PA of fellow group members' contribution to group work) (Strijbos et al. 2009).

5.2 Relationship of PA and Co-Regulation

The presence of the 'other' is emphasized in the literature devoted to the development of SRL skills, and is deeply grounded in a Vygotskian perspective on learning and development (McCaslin 2009; McCaslin and Hickey 2001). According to this perspective, students develop their skills in a context where they can observe and emulate significant others, an event

known as ‘co-regulation’ that ‘connotes shared responsibility’ (McCaslin and Hickey 2001, p. 243). In situations of co-regulation, the teacher’s assessment of students’ progress interacts with the students’ own attributions and interpretations:

Self-evaluation of personal progress is a central feature of social learning theory. In a Vygotskian tradition, self-evaluation is as much about personal meaning and affect as it is about progress toward standards, especially those set by others (McCaslin and Hickey 2001, p. 248).

Furthermore, co-regulation through interaction with peer aligns well with the Vygotskian notion of the zone of proximal development (ZPD), which delineates what the student can do with some scaffolding and help from others. In PA, the peer acts as a source of such help and thus as a co-regulator of learning by the student who receives the PA. Naturally, this hinges on the quality of the PA provided as well as whether the assessee agrees with the PA and uses the suggestions.

Recent research on the ‘role of the other’ in SRL may be divided into two orientations: (1) ‘Co-regulated learning’, which are situations where a temporary coordination of regulation occurs between the student and a significant other (i.e., teacher or peer) and (2) ‘Shared regulation of learning’ where the regulatory processes are interdependent among the students who are participating in a collaborative task (Hadwin et al. 2011). In co-regulated learning, the student’s interaction with others allows the student to internalize regulatory processes. In socially shared regulation of learning, the students work as a coherent team to attain common goals. Furthermore, in socially shared regulation, all students participate equally in the regulation of each other’s actions, whereas in co-regulation, the student interacts with a person who has a superior or more expert role (teacher or more knowledgeable peer). Recent research has shown that both shared- and co-regulation can be empirically differentiated, with shared regulation enhancing group performance and the use of more advanced shared strategies (Panadero and Järvelä 2015).

In terms of co-regulation, teachers often play the part of the significant other via the assessments they produce, by acting as a role model or by guiding and/or assessing the students who need to learn how to regulate their learning (Andrade and Brookhart 2014). As such, classroom assessment is conceptualized as a way to promote students’ regulation of learning, especially if the assessment practices follow the principles of AfL (Andrade and Brookhart 2014). In addition, teachers can provide opportunities for students to act as co-regulators of their peers’ learning via PA, which has simultaneously an impact on the peer assessors’ SRL skills (Nicol and McFarlane-Dick 2006).

5.3 Empirical Evidence of the Relationship between PA and Co-Regulation

Empirical evidence of a connection between PA as an instance of co-regulation and enhanced outcomes is scarce. One example is the research by van Zundert (2012) and her colleagues. In a review of effective peer assessment processes, van Zundert et al. (2010) found four studies showing that peer feedback (the main PA process) ‘positively influenced domain-specific skill’ (p. 274). It should be noted that none of the four studies explicitly positioned PA as an instance of co-regulation. The interaction between domain-specific skills and PA was further studied in two empirical investigations (van Zundert, Könings et al. 2012; van Zundert, Sluijsmans et al. 2012). One of the conclusions from these studies is that it is probably better if students develop some of the domain-specific skills *before* they are asked to peer assess.

This conclusion was drawn from a cognitive load theory standpoint: when learning novel tasks, students' cognitive capabilities are directed towards the activity at hand, which means that there is not enough 'cognitive space' for handling additional demanding activities, such as PA (van Zundert, Sluijsmans et al. 2012). This implies that for students to act as effective co-regulators, they need sufficient domain-specific knowledge and skills. The minimum required degree of domain-specific knowledge and skills is, however, an open issue and it may very well be domain and task dependent. In sum, despite the theoretical connections between PA and co-regulation, there is clearly a need for future research to explore this connection explicitly and in more detail.

5.4 The Role of the Teacher in Promoting PA: Guidelines for Implementation

While SA may occur without the teacher promoting such practice in the classroom, teacher intervention is almost always necessary to introduce formal PA as part of their classroom AfL practice. Another difference between SA and PA is that it might be even more important to consider the tensions between summative and formative uses of PA. For example, Panadero (2016), reviewed research on interpersonal factors of PA and concluded that formative approaches to PA (i.e. approaches including peer feedback and the possibility to interact with each other) seem to reduce the impact of negative interpersonal factors (e.g., feelings of unfairness), whereas summative approaches to PA (such as peer grading) can reinforce tensions among assessors and assessees. Nevertheless, it has been shown that some approaches to PA that combine formative and summative purposes can support student learning (depending on the quality of the feedback) and that tensions can be mitigated if the PA score is explained via peer feedback (Panadero 2016). In summary, teachers need to be aware of both the benefits and the limitations of PA in order to make informed decisions on how to implement PA in their classrooms. In the worst-case scenario, formative assessment intentions might be transformed into recurrent and fragmented summative assessments, which may impair the solidarity of the students in the class.

With these considerations in mind, we compiled some guidelines for teachers' implementation of PA. These guidelines are based on a list of principles proposed by Topping (2003), but we removed recommendations referring to strictly summative approaches to PA and rephrased some recommendations in such a way that they apply to various types of PA. When following these recommendations, teachers will still need to tailor proposed PA practices in relation to the learning goals, the task, and the specific context of each individual classroom.

1. Clarify the purpose of PA, its rationale and expectations to the students
2. Involve students in developing and clarifying assessment criteria
3. Match participants (e.g., individuals, groups) in a way that fosters productive PA
4. Determine the PA format (e.g., rating with or without comments) and mode of PA interaction (e.g., face-to-face or online)
5. Provide quality PA training, examples and practice (including feedback about PA)
6. Provide rubrics, scripts, checklists or other tangible scaffolding for PA
7. Specify PA activities and timescale
8. Monitor the PA process and coach students

6 General Conclusions

AfL practices refer to a type of educational assessment in which student involvement and feedback are central. In other words, assessment is used to generate feedback by and for the students. Two of the most important AfL practices in this respect are SA and PA. In this chapter we discussed the connections of both SA and PA to SRL. It is evident from this discussion that there is both theoretical and empirical support for the relationship between SA and SRL, and that training in SA may indeed enhance the use of SRL skills. In contrast, the relationship between PA and co-regulation is still very much implicit; very few theoretical and empirical studies have investigated this issue.

Even if the promotion of SA has been shown to increase the use of SRL in different contexts, it is currently not possible to identify which specific interventions or instruments would be the most effective in enhancing SRL skills. However, the formulation of explicit criteria for SA purposes, so that the students may set realistic goals and evaluate their progress (both during the process and afterwards), seems to be a particularly promising way forward. As has been shown, explicit criteria may support all of the SRL phases and several recommendations for the implementation of SA in the classroom are connected to the use of such criteria. For example, teachers should make the criteria by which students assess their work explicit, teach the students how to apply the criteria, give students feedback on their SA, help students in using SA information to improve their performance, and provide sufficient time for revision after SA.

Although there is less empirical evidence that directly supports the relation between SRL and PA, the available evidence suggest that it is of utmost important to clarify the rationale for PA in advance, involve students in determining the criteria, clearly specify the PA format as well as how students are supposed to interact, and provide them with sufficient training and scaffolds to conduct the PA activities. Scaffolding may be particularly important in situations where students' domain-specific knowledge and skills are limited.

Nevertheless, a major challenge for the implementation of both SA and PA is that many teachers – when given the choice – prefer to not promote students' active involvement in assessment (e.g., Jonsson et al. 2015; Panadero and Brown 2015). It is thus important to develop recommendations based on the research literature about how to support teachers in their implementation of SA and PA, as part of an overall AfL approach to classroom assessment, for instance, by encouraging teachers to work together in professional learning communities. In such communities, teachers may be encouraged by colleagues to work with SA and/or PA, which in turn may affect whether the teachers are likely to engage with these pedagogical resources in their classrooms. Furthermore, such communities may also facilitate discussions on effective designs for SA and PA, and on how teachers can best implement them to foster student learning and SRL skills. After all, having positive experience with SA is one of the strongest predictors for further use of SA (Panadero et al. 2014b).

Finally, the implementation of both SA and PA entails risks: (a) a formative assessment activity intended to support student learning could turn into a solely summative event, and (b) if poorly designed, SA or PA could become an activity in itself that consumes valuable classroom time without necessarily contributing effectively to student learning. Although the use of SA and PA has been shown to have several positive effects on student motivation and learning, there are no well-designed studies showing positive effects of self- or peer grading. Summative uses of SA and PA seem to have a number of negative effects which could counteract the intentions of AfL, such as students overestimating their own performance or providing less than constructive feedback to particular peers. Nevertheless, given these

caveats, an increased research effort in exploring the effects of AfL practices – and of SA and PA in particular – constitutes a promising classroom assessment perspective, especially if recommendations such as the ones provided here, are implemented.

Acknowledgements This chapter is based in part on research funded by the Spanish Ministry (Ministerio de Economía y Competitividad) via Ramón y Cajal funding granted to the first author (File id. RYC-2013-13469).

References

Andrade, H., & Brookhart, S. M. (2014, April). Assessment as the regulation of learning. Paper presented at the American Educational Research Association, Philadelphia, USA.

Andrade, H., & Du, Y. (2005). Student perspectives on rubric-referenced assessment. *Practical Assessment, Research & Evaluation, 10*(3), 1-11.
<http://pareonline.net/getvn.asp?v=10&n=3>

Andrade, H., & Valtcheva, A. (2009). Promoting learning and achievement through self-assessment. *Theory Into Practice, 48*(1), 12–19.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy and Practice, 5*(1), 7–73.

Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology, 54*(2), 199–231.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.

Boud, D., & Falchikov, N. (1989). Quantitative studies of student self-assessment in higher-education: A critical analysis of findings. *Higher Education, 18*(5), 529–549 (1989). doi: 10.1007/BF00138746

Brown, G. T. L., & Harris, L. R. (2013). Student self-assessment. In J. McMillan (Ed.), *The SAGE handbook of research on classroom assessment* (pp. 367–393). Thousand Oaks, CA: SAGE.

Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research, 65*(3), 245–281.

Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review, 24*(2), 205–249 (2012). doi: 10.1007/s10648-011-9191-6

de la Harpe, B., & Radloff, A. (2000). Informed teachers and learners: The importance of assessing the characteristics needed for lifelong learning. *Studies in Continuing Education, 22*(2), 169–182 (2000). doi: 10.1080/01580379950177323

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning, 3*, 231–264 (2008). doi: 10.1007/s11409-008-9029-x

- Hadwin, A. F., Järvelä, S., & Miller, M. (2011). Self-regulated, co-regulated, and socially shared regulation of learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 65–84). New York: Routledge.
- Harris, L. R., & Brown, G. T. L. (2013). Opportunities and obstacles to consider when using peer- and self-assessment to improve student learning: Case studies into teachers' implementation. *Teaching and Teacher Education*, *36*(0), 101–111 (2013). doi: <http://dx.doi.org/10.1016/j.tate.2013.07.008>
- Jonsson, A. (2013). Facilitating productive use of feedback in higher education. *Active Learning in Higher Education*, *14*(1), 63–76 (2012). doi: 10.1177/1469787412467125
- Jonsson, A. (2014). Rubrics as a way of providing transparency in assessment. *Assessment & Evaluation in Higher Education*, *39*(7), 840–852 (2014). doi: 10.1080/02602938.2013.875117
- Jonsson, A., Lundahl, C., & Holmgren, A. (2015). Evaluating a large-scale implementation of Assessment for Learning in Sweden. *Assessment in Education: Principles, Policy & Practice*, *22*(1), 104–121 (2015). doi:10.1080/0969594X.2014.970612
- Jonsson, A., & Svingby, G. (2007). The use of scoring rubrics: Reliability, validity and educational consequences. *Educational Research Review*, *2*, 130–144 (2007). doi:10.1016/j.edurev.2007.05.002
- Kostons, D., van Gog, T., & Paas, F. (2012). Training self-assessment and task-selection skills: A cognitive approach to improving self-regulated learning. *Learning and Instruction*, *22*(2), 121–132 (2012). doi: 10.1016/j.learninstruc.2011.08.004
- Kramarski, B., & Michalsky, T. (2009). Three metacognitive approaches to training pre-service teachers in different learning phases of technological pedagogical content knowledge. *Educational Research and Evaluation: An International Journal on Theory and Practice*, *15*(5), 465–485.
- Lan, W. Y. (1998). Teaching self-monitoring skills in statistics. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning: From teaching to self-reflective practice* (pp. 86–105). New York: Guilford Press.
- McCaslin, M. (2009). Co-regulation of student motivation and emergent identity. *Educational Psychologist*, *44*(2), 137–146 (2009). doi: 10.1080/00461520902832384
- McCaslin, M., & Hickey, D. T. (2001). Self-regulated learning and academic achievement: A Vygotskian view. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement* (pp. 227–252). New York: Lawrence Erlbaum Associates.
- Nicol, D., & McFarlane-Dick, D. (2006). Formative assessment and self-regulated learning, a model and seven principles of good feedback practice. *Studies in Higher Education*, *31*(2), 199–218 (2006). doi: 10.1080/03075070600572090

Olina, Z., & Sullivan, H. J. (2004). Student self-evaluation, teacher evaluation, and learner performance. *Educational Technology Research and Development*, 52(3), 5–22 (2004). doi: 10.1007/BF02504672

Panadero, E. (2011). *Instructional help for self-assessment and self-regulation: Evaluation of the efficacy of self-assessment scripts vs. rubrics*. Doctoral dissertation, Universidad Autónoma de Madrid, Spain.

Panadero, E. (2016). Social, interpersonal and human effects of peer assessment: A review and future directions. In G. T. L. Brown & L. R. Harris (Eds.), *Human factors and social conditions of assessment*. New York: Routledge.

Panadero, E., & Alonso-Tapia, J. (2013). Self-assessment: Theoretical and practical connotations. When it happens, how is it acquired and what to do to develop it in our students. *Electronic Journal of Research in Educational Psychology*, 11(2), 551–576 (2013). doi: <http://dx.doi.org/10.14204/ejrep.30.12200>

Panadero, E., & Alonso-Tapia, J. (2014). How do students self-regulate? Review of Zimmerman's cyclical model of self-regulated learning. *Anales De Psicología*, 30(2), 450–462 (2014). doi: <http://dx.doi.org/10.6018/analesps.30.2.167221>

Panadero, E., Alonso-Tapia, J., & Huertas, J. A. (2012). Rubrics and self-assessment scripts effects on self-regulation, learning and self-efficacy in secondary education. *Learning and Individual Differences*, 22(6), 806–813 (2012). doi: 10.1016/j.lindif.2012.04.007

Panadero, E., Alonso-Tapia, J., & Huertas, J. A. (2014a). Rubrics vs. self-assessment scripts: Effects on first year university students' self-regulation and performance. *Infancia y Aprendizaje: Journal for the Study of Education and Development*, 37(1), 149–183.

Panadero, E., Alonso-Tapia, J., & Reche, E. (2013). Rubrics vs. self-assessment scripts effect on self-regulation, performance and self-efficacy in pre-service teachers. *Studies In Educational Evaluation*, 39(3), 125–132 (2013). doi: 10.1016/j.stueduc.2013.04.001

Panadero, E., & Brown, G. T. L. (2015). *Higher education teachers' assessment practices: Formative espoused but not yet fully implemented*. Paper presented at the Fifth Assessment in Higher Education Conference 2015, Birmingham, (UK).

Panadero, E., Brown, G. T. L., & Courtney, M. G. R. (2014b). Teachers' reasons for using self-assessment: A survey self-report of Spanish teachers. *Assessment in Education: Principles, Policy & Practice*, 21(3), 365–383 (2014). doi: 10.1080/0969594X.2014.919247

Panadero, E., & Järvelä, S. (2015). Socially shared regulation of learning: A review. *European Psychologist*. doi: 10.1027/1016-9040/a000226

Panadero, E., & Jonsson, A. (2013). The use of scoring rubrics for formative assessment purposes revisited: A review. *Educational Research Review*, 9, 129–144 (2013). doi: <http://dx.doi.org/10.1016/j.edurev.2013.01.002>

Panadero, E., & Romero, M. (2014). To rubric or not to rubric? The effects of self-assessment on self-regulation, performance and self-efficacy. *Assessment in Education: Principles, Policy & Practice*, 21(2), 133–148 (2014). doi: 10.1080/0969594X.2013.877872

Paris, S. G., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89–101.

Ross, J. A. (2006). The reliability, validity, and utility of self-assessment. *Practical Assessment Research & Evaluation*, 11. <http://pareonline.net/getvn.asp?v=11&n=10>. Accessed 7 May 2015.

Segers, M., Nijhuis, J., & Gijsselaers, W. (2006). Redesigning a learning and assessment environment: The influence on students' perceptions of assessment demands and their learning strategies. *Studies In Educational Evaluation*, 32(3), 223–242 (2006). doi: <http://dx.doi.org/10.1016/j.stueduc.2006.08.004>

Strijbos, J. W., Ochoa, T. A., Sluijsmans, D. M. A., Segers, M., & Tillema, H. H. (2009). Fostering interactivity through formative peer assessment in (web-based) collaborative learning environments. In C. Mourlas, N. Tsianos & P. Germanakos (Eds.), *Cognitive and Emotional Processes in Web-Based Education: Integrating Human Factors and Personalization* (pp. 375–395). Hersey, PA: IGI Global.

Tan, K. H. K. (2012). *Student self-assessment. Assessment, learning and empowerment*. Singapore: Research Publishing.

Topping, K. J. (1998). Peer assessment between students in colleges and universities. *Review of Educational Research*, 68(3), 249–276.

Topping, K. J. (2003). Self and peer assessment in school and university: Reliability, validity and utility. In M. Segers, F. Dochy & E. Cascallar (Eds.), *Optimising new modes of assessment: In search of qualities and standards* (Vol. 1, pp. 55–87): Springer Netherlands.

van Zundert, M. (2012). *Conditions of peer assessment for complex learning*. Doctoral dissertation, Maastrich University.

van Zundert, M., Sluijsmans, D., & Van Merriënboer, J. (2010). Effective peer assessment processes: Research findings and future directions. *Learning and Instruction*, 20(4), 270–279 (2010). doi: 10.1016/j.learninstruc.2009.08.004

van Zundert, M. J., Könings, K. D., Sluijsmans, D. M. A., & van Merriënboer, J. J. G. (2012). Teaching domain-specific skills before peer assessment skills is superior to teaching them simultaneously. *Educational Studies*, 38(5), 541–557 (2012). doi: 10.1080/03055698.2012.654920

van Zundert, M. J., Sluijsmans, D. M. A., Könings, K. D., & van Merriënboer, J. J. G. (2012). The differential effects of task complexity on domain-specific and peer assessment skills. *Educational Psychology*, 32(1), 127–145 (2011). doi: 10.1080/01443410.2011.626122

William, D. (2014, April). Formative assessment and contingency in the regulation of learning processes. Paper presented at the American Educational Research Association, Philadelphia, USA.

William, D., & Thompson, M. (2007). Integrating assessment with learning: what will it take to make it work? In C. A. Dwyer (Ed.), *The future of assessment: Shaping teaching and learning* (pp. 53–82). Mahwah, NJ: Lawrence Erlbaum Associates.

Winne, P. H. (2014, April). Fusing self-regulated learning with formative evaluation to improve education. Paper presented at the American Educational Research Association, Philadelphia, USA.

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–40). San Diego, CA: Academic Press.

Zimmerman, B. J. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational Psychologist*, *48*(3), 135–147 (2013). doi: 10.1080/00461520.2013.794676

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York: Routledge.

Zimmerman, B. J., & Schunk, D. H. (2001). *Self-regulated learning and academic achievement*. New York: Lawrence Erlbaum Associates.

Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance*. New York: Routledge.