

Positive Feedback Loops for Lifelong Learning:
Exploring the Interplay Between Self-regulation, Metacognition, and Feedback

by

Graham Treloar

BSc, University of Victoria, 2006
BEd, University of Victoria, 2010

A Project Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF EDUCATION

in the area of Curriculum Studies

Department of Curriculum and Instruction

© Graham Treloar, 2019
University of Victoria

All rights reserved. This project may not be reproduced in whole or in part, by photocopy or other means, without the permission of the author.

Supervisory Committee

Positive Feedback Loops for Lifelong Learning:
Exploring the Interplay Between Self-regulation, Metacognition, and Feedback

by

Graham Treloar
BSc, University of Victoria, 2006
BEd, University of Victoria, 2010

Supervisory Committee

Michelle Wiebe
Department of Curriculum and Instruction
Supervisor

Ted Riecken
Department of Curriculum and Instruction
Second Reader

Abstract

Metacognition, self-regulation, and the ability to receive and engage with feedback in constructive ways, are essential for the development of capable, lifelong learners. The literature review in this project examines research on self-regulated learning and metacognition, effective feedback practices, and how learners respond to feedback, both emotionally and cognitively. Clear, transparent feedback is necessary for and scaffolds the development of metacognition and self-regulated learning, and metacognitive, self-regulated learners have the capacity to select and use regulatory and learning strategies that support active engagement with feedback. Self-efficacy, motivation, and achievement emotions are also influenced by the interplay between feedback, metacognition, and self-regulated learning. A series of personal reflections are interwoven throughout the literature review, situated within the context of the research. The reflections relate to classroom experiences and potential implications for future practice.

Table of Contents

Supervisory Committee	ii
Abstract	iii
Table of Contents	iv
List of Tables	v
List of Figures	vi
Acknowledgments	vii
Chapter 1: Responses to Assessment and the Interplay with Metacognition and Self-Regulation. 1	
Entry Points	1
Connection to British Columbia’s New Curriculum	4
Topics Examined in the Literature Review	5
Summary of Project	5
Chapter 2: Literature Review	6
Developing Lifelong Learner Potential Through the Interplay of Feedback, Metacognition, and Self-Regulation	6
Metacognition and Self-Regulated Learning	7
Overview of Feedback	18
Emotions and Feedback	26
Engaging with Feedback	36
Exit Points	52
References	56

List of Tables

Table 2.1 *Characteristics and strategies of self-regulated learning*.....13

Table 2.2 *Intervention clusters and components identified by Winstone et al.*.....50

List of Figures

<i>Figure 2.1</i> Reflections on metacognition in the classroom	9
<i>Figure 2.2</i> An integrated framework for metacognition and self-regulated learning	11
<i>Figure 2.3</i> Reflections on models of self-regulated learning.....	16
<i>Figure 2.4</i> An integrated model of self-regulated learning including the three phases and levels of competency	17
<i>Figure 2.5</i> Reflections on the development of self-regulated learning and self-efficacy.....	18
<i>Figure 2.6</i> Reflections on the relationship between feedback and the development of self-regulation	22
<i>Figure 2.7</i> Reflections on using self-assessment to develop self-regulated learning.....	25
<i>Figure 2.8</i> Reflections on the connection between grades, identity, and emotions.....	31
<i>Figure 2.9</i> Reflections on influencing the effects of mediators and moderators between emotions and feedback.....	34
<i>Figure 2.10</i> Reflections on engagement with feedback	38
<i>Figure 2.11</i> Reflections on sender variables and the importance of relationships	39
<i>Figure 2.12</i> Reflections on personalized feedback	43
<i>Figure 2.13</i> Reflections on grades and recipience of feedback	46
<i>Figure 2.14</i> Reflections on assessment literacy and the new curriculum.....	51

Acknowledgments

I would like to express my appreciation for my supervisor, Dr. Michelle Wiebe, who provided valuable guidance and feedback throughout this project and to Dr. Ted Riecken for his feedback and encouragement. I would also like to thank my professors, particularly Dr. Jennifer Thom, who throughout the program provided exposure to disruptive ideas and thinkers, encouraged the exploration of new spaces, and provided meaningful feedback. I also appreciate my colleagues, who created a rich space to explore new ideas and make new meaning. Finally, I would like to acknowledge my wife, Shelley, and family for their support and encouragement throughout the program.

Chapter 1: Responses to Assessment and the Interplay with Metacognition and Self-Regulation

Entry Points

I emerged from a weekend camping trip in the backcountry and felt a brief spike of adrenaline when I saw the subject line of the email, recognizing it was my last graded assignment for my final graded master's course. I had put a significant amount of effort and time into the writing, attempting to be thoughtful and reflective. I quickly scanned the comments: positive, pushing me to think in new directions. I experienced a strong sense of satisfaction and validation when I saw the mark. This response was the result of years of conditioning. I then proceeded to go back and carefully read and consider all of the descriptive feedback.

The preceding illustrates that even for an experienced academic learner, there is often an emotional response to assessment. A learner's perception of assessment can have a significant influence on how they view learning and develop as a learner. As a learner, assessment has always motivated and interested me, though not always for what I would now consider to be the right reasons. For much of my time as a student, I perceived external pressures that emphasized doing well at school rather than emphasizing learning, although a common belief then – and for many still today – was that learning and grades are synonymous. I now believe they often are not, but do believe in assessment's important role in developing capable, lifelong learners, with the emphasis on learning rather than simply developing students who are good at school.

Throughout my secondary and a lot of my post-secondary education, I saw grades as a benchmark and monitored performance to stay within a target range. I was adept at studying and performing well on exams, though this did not necessarily serve a love of learning outside of the

formal education setting. It was not so much about the learning, but motivation through extrinsic reward and external validation.

Each time I would receive feedback or a mark, it would contribute to my sense of self and ability and it would also affect how I felt about the topic or the learning that had happened.

When I had really positive feedback or marks, I would feel really good about the learning and when I think back on those assignments, I still feel a sense of satisfaction. If the mark was lower than what I had expected, I would not feel as positive toward that learning task. Assessment had the power to affect how I felt about learning, but also helped to develop my ability to think about learning and self-regulate as a learner.

Even in graduate school, these reactions persisted. However, in later years, my focus has shifted more towards learning for learning's sake as I further develop metacognitive skills and the ability to self-regulate as a learner. I covet detailed feedback to push my thinking into new places, and feel deeply satisfied after expending a lot of effort on an assignment, whether there was external validation or not. A difference from the earlier years has been that if the evaluation was not aligned with what I expected, I still view it as a positive learning experience. Upon reflection, I believe there is an important interplay between how assessment is experienced, metacognition, and self-regulation and the production of capable, lifelong learners who are motivated to learn for learning's sake.

There was a two-way reciprocal relationship between developing self-regulation and metacognition through experiencing assessment, but self-regulation and metacognition have also influenced how I was able to experience and frame assessments. I am seeking to explore the ways in which my own personal experiences with assessment might assist my students in their learning journeys from an earlier age.

It was the first year I had taught Grade 7. Sunlight spilled into the portable amid the murmurs as students received their summative project feedback and evaluation for their climate change research presentations. The two girls, who had expressed such satisfaction with their project, had big smiles and were upbeat – until they received their evaluation. Their shoulders dropped, facial expressions soured. I could feel the dissatisfaction emanating. Their project had been evaluated at a B level, but in discussions with them after, they felt the amount of time and effort they had put into the project had warranted an A and that is what they had expected.

The above vignette is a clear illustration of how assessment can influence how students view their learning. As a teacher, I often feel a tension when assessing students. On one hand, I see my role as moving the learning forward from where the student is by providing targeted feedback. On the other, I see the importance of evaluating based on criteria and proficiency level, as this is important in communication with both learners and parents about where learners are in their learning and where they can improve. Just as it is a doctor's responsibility to assess and give their patients an evaluation, it is also a teacher's role to evaluate and share evaluative information. In the situation described above, the evaluation tarnished the satisfaction and joy of learning the girls had and potentially could have affected their relationship with me and future learning. They were given the opportunity afterward to improve the project with feedback to try to push the learning to a new level, but the difference in their expectation compared to the evaluated level sealed it for them, and they were finished with the learning. These days, I incorporate more informal, formative feedback throughout a major assignment, but still encounter a range of reactions to assessment (see for example Lipnevich, Berg, & Smith, 2016; Stiggins, 2018; Vogl & Pekrun, 2016). If the girls' project had been evaluated at an A, would they have felt more satisfied and thought back on the learning as a more positive experience or

seen themselves as ‘good’ at science or research compared to ‘not-so-good’ at it? I wonder how teachers can support learners in their interpretations of assessments so the assessments do not negatively affect learning experiences and instead support further learning? As with my own experiences, I wonder how the two-way reciprocal relationship between developing self-regulation and metacognition through assessment and experiencing assessment can be fostered with students in the classroom.

From my experiences as a learner and as a teacher, I wonder about the relationship between assessment and feedback, learning, metacognition, motivation, and self-regulation. I wonder how they interact as a system that affects current and future learning. Feedback can be so powerful in learning, and there are myriad potential variables that can influence how the learner will receive the feedback or evaluation. This can have profound influence on how learners view themselves; affect their overall learning experiences, both positively and negatively; affect future learning choices; and possibly even the course of their lives. If we expect that a goal of any education system should be to produce capable, lifelong learners, understanding and being aware of oneself as a learner (metacognition) and being able to regulate and interpret emotion and cognition related to learning in response to assessment can contribute to this goal.

Connection to British Columbia’s New Curriculum

Assessment, metacognition, and self-regulation are highly relevant to the new BC curriculum. There has been a marked shift from producing passive learners to striving to produce learners who have more agency, more voice and choice, and are more aware of themselves as learners. There is a shift towards self-assessment and acquiring proficiency in broader competencies that span the curriculum. According to the Ministry website (British Columbia Ministry of Education, n.d.), there will be even more emphasis on ongoing classroom assessment

as it can “guide the learner to understand their misconceptions and use the information to set new learning goals.” Even with the move away from grades and towards proficiency scales, students continue to have reactions to their evaluations.

With a new emphasis on classroom assessment and producing learners who are self-aware and able to adapt and continue their learning beyond the classroom, it is important that learners are able to receive and use assessment feedback in constructive ways to drive their learning. It is also important that students develop their ability to self-regulate and think about themselves as learners, and assessment can play a part in this.

Topics Examined in the Literature Review

The first section of the literature review examines research on the significance of self-regulated learning and metacognition in learning. The second section begins with a short review of research on effective classroom feedback practices and then focuses on how learners respond to classroom assessment and feedback. This section is organized into two subtopics: (a) emotional responses to feedback; (b) cognitive responses to feedback, including how learners engage with feedback. The two-way reciprocal relationship between developing self-regulation and metacognition through experiencing assessment and the framing of feedback and assessments through the development of self-regulation and metacognition will also be discussed.

Summary of Project

The project is a series of reflections that relate to classroom experiences and potential implications for future practice. They are interwoven throughout the literature review, situated in the context of the research.

Chapter 2: Literature Review

Developing Lifelong Learner Potential Through the Interplay of Feedback, Metacognition, and Self-Regulation

There are many variables that can affect the development of lifelong learners. Understanding and being aware of oneself as a learner and being able to regulate and interpret emotion and cognition related to learning in response to assessment can play a significant role in the development of proficient learners. Bandura (1997) offers that, “a fundamental goal of education is to equip students with the self-regulatory capabilities that enable them to educate themselves” (p. 174). The benefits of metacognition and self-regulation extend beyond learning. According to Csikszentmihalyi (2008), “People who learn to control inner experience will be able to determine the quality of their lives, which, is as close as any of us can come to being happy” (p. 2). The metacognitive cycle of planning, monitoring, and evaluation is seen by some (e.g. Stiggins, 2002; Black & Jones, 2006) as the foundation of lifelong learning, since learners are able to “monitor their own success and make decisions that bring greater success” (Stiggins, 2002, p. 764). Feedback is an important entity within a system of developing proficient learners; it can influence the development of metacognition and self-regulated learning (Clarke, 2012) and responses to feedback can be moderated by metacognition and self-regulation.

The purpose of this literature review is to examine the interrelationship between self-regulated learning, metacognition, and how learners respond to feedback. The first section examines research on the significance of self-regulated learning and metacognition in learning. The second section begins with a short review of research on effective classroom feedback practices and then focuses on how learners respond to classroom assessment and feedback. This section is organized into two subtopics: (a) emotional responses to feedback; (b) how learners

engage with feedback. The two-way reciprocal relationship between developing self-regulation and metacognition through experiencing assessment and the framing of feedback and assessments will also be discussed throughout.

Metacognition and Self-Regulated Learning

“The most powerful learners are those who are reflective, who engage in metacognition — thinking about what they know — and who take control of their learning” (Boaler, 2016, p. 150). A learner’s ability to understand themselves as a thinker and employ agency in their environment can have profound impact on their ability to learn and on their quality of life. Metacognition has been studied formally since the 1970s, though its origins in education can be traced back even further to educational heavyweights such as Vygotsky, Dewey, and Piaget (Fox & Riconscente, 2008). In 1976, John Flavell was the first to use it as a conceptual lens to understand learning (as cited in Butler, 2015). The topic has been attractive to study because it offers a model to explain how individuals can employ control and agency in learning (Butler, 2015) and many studies show that learners’ ability to take control of their learning and performance predicts success (Butler, 2015). Metacognition is complementary to self-regulated learning that will be discussed in another section.

What is metacognition? A simple definition of metacognition is that it is the awareness of knowledge about one’s thinking (Zimmerman, 2002). *Meta* originates from the Greek “after” or “beyond” but in English often signifies “about”. As Winne (2017) characterizes it, metacognition “is cognition about information input to or output by cognition as well as information about the operations that work on information” (p. 38). Metacognition has the same fundamental operations as cognition, but the topics are qualities of thoughts and thinking (Winne, 2017). It is part of a system that includes knowledge about, reflection on, and regulation

of one's cognitive activities (Butler, 2015). A quintessential component of metacognition is the ability to make automatic processes become part of conscious thought when the need for more deliberate processing is necessary (Butler, 2015). Nelson and Narens' (1990) description of metacognition is particularly clear.

Principle 1: cognitive processes are split into two or more specific interrelated levels...the meta-level and the object-level

Principle 2: The meta-level contains a dynamic model (e.g. mental stimulation) of the object-level

Principle 3: There are two dominance relations, called "control" and "monitoring," which are defined in terms of the direction of the flow of information between the meta-level and the object-level. (p 126-127)

There are diverse models of metacognition and areas of research have included metamemory (what a learner knows about how memory works), metacognition, and metaemotion (Winne, 2017). All models are multidimensional (Butler, 2015). Dimensions of metacognition include (a) metacognitive knowledge and beliefs, which are related to themselves and others as learners, activities and tasks, cognitive processes; (b) orchestrating cognitive activities such as attention, planning, monitoring, revising strategies and goals; (c) metacognitive awareness, required to be aware of knowledge and learning process reflections to take deliberate control, though some metacognitive activity is outside of conscious awareness. Reflective thinking is considered a key process that connects "knowledge to an analysis of the relationship between current experience and future action" (McAlpine & Weston, 2002, p. 69) and has been shown to be a "key ingredient in the commitment to lifelong learning" (Kuiper & Pesut, 2004, p. 382). Some (e.g. Kuiper & Pesut, 2004) have highlighted the particular importance of reflection-

in-action, the combination of monitoring and reflection which allows reshaping as a task is being worked on.

Metacognitive knowledge also refers to the contents of memory that supply standards for metacognitive monitoring and includes misconceptions and learned strategies (Winne, 2017). Two types of motivational beliefs include attributions, causal explanations students associate with performance, and self-efficacy, students' beliefs about their ability. Limitations in these areas can considerably affect learning.

A few years ago, the second term had ended and it was a point in my teaching practice when I had been making an effort to incorporate more reflection into my students' practice. Students were completing a guided reflection about the term. The Google Form that I had provided, contained basic prompts such as what the students did well, what they felt they could improve, and what their next steps were to be. Chloe* was a student who had demonstrated low self-efficacy for academic activities and throughout the year had often explicitly communicated her perceived lack of ability to me. Her performance was not strong and her motivation was not high. However, throughout the second term she had started to seek help more frequently and became more open to being willing to put in time and effort to learn. We often chatted about strategies such as how to study effectively and discussed how successful learners dedicate time to learning. Changes that she had made that mirrored these conversations revealed that she was a capable learner. She had completed her Google Form, had a pleased expression, and was eager to share with me what she had written. A significant revelation she expressed was, "I used to think everything was too hard, but now if I study I can do it."

Her reflection seemed to solidify the transformation that was already underway. Her self-efficacy and ability to think about herself as a learner followed an upward trajectory, and her ability to take control deliberately of a learning activity and select appropriate learning strategies improved. In the following school year, she ended up in the classroom next to mine. We would often talk and she would give examples of how well she was doing. She frequently related her results back to that new understanding of the connection between the process and outcome. This is just one example of how reflection can be a powerful tool. I have found students to be honest in their reflections, though sometimes they may need help making connections and viewing their reflections holistically.

*Chloe is a pseudonym.

Figure 2.1 Reflections on metacognition in the classroom.

What is self-regulated learning and why is it important to education? Dumont, Istance, and Benavides (2012) say to thrive in 21st century, individuals need to be lifelong

learners with the ability to self-direct learning and performance. Self-regulated learning has been linked to lifelong learning by a number of studies (e.g. OECD, 2008; Hoskins & Fredriksson, 2008). Effective learners are able to self-regulate and determine what they want to learn, and Butler and Winne (1995) see self-regulated learning as a pivot for academic achievement. The more influential force in creating self-regulated learning is metacognition (Clarke, 2012). Kaplan (2008) concluded that metacognition and self-regulated learning are not distinct concepts, but “subtypes of the same general abstract phenomenon of self-regulated action” (p. 483). Butler and Winne (1995) indicate that, “monitoring is the hub of self-regulated task engagement and the internal feedback it generates is critical in shaping the evolving pattern of a learner’s engagement with a task” (p. 275).

The essence of self-regulated learning is that the learner is in control (Winne, 2017), autonomous, and independent (Clarke, 2012). Self-regulation in learning refers to the learners’ ability to control their thoughts and actions, achieve goals, and respond to their environment (Butler, 2015). A central theme in self-regulated learning is the connection between tacit knowledge and internalizing new knowledge (Clarke, 2012). Zimmerman (1989) refers to self-regulated learning as the degree to which students are “metacognitively, motivationally, behaviorally active participants in their own learning process” (p. 329). Self-regulated learning is a cyclical process that involves learners organizing and directing behaviour and actions in order to attain a specific goal (Zimmerman, 2000a). To get a sense of the importance of self-regulation in learning, one study showed that effective self-regulation can predict academic success even more than IQ or knowledge about reading and math (Veenman & Spaans, 2005).

There are different models of self-regulated learning, though they are all related to how an individual can take control of their learning and performance (Butler, 2015). The interplay

between cognition and metacognition is the focus of research on self-regulated learning (Winne, 2017). Metacognition and self-regulated learning are complementary and can be thought of as part of an integrated framework as seen in Figure 2.2. This framework, among other things, emphasizes the idea that experiences, strengths, challenges, knowledge, skills, and beliefs are not fixed, but rather refined or transformed as learners engage in learning (Butler, 2015). Learners who are self-regulating need broad metacognitive knowledge that is useful in their learning activities (Winne, 2017).

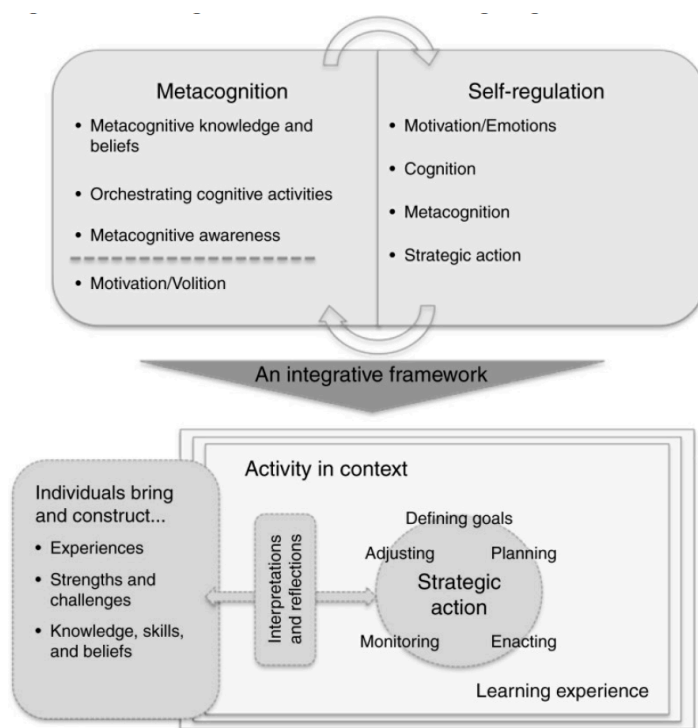


Figure 2.2 An integrated framework for metacognition and self-regulated learning (Butler, 2015).

Self-efficacy and self-regulated learning. Self-efficacy refers to “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1994, p. 2). Self-efficacy is essential for self-regulated learning and is considered the motivational aspect of self-regulated learning (Clarke, 2012).

Self-regulated learners show a strong sense of self-efficacy (Bandura, 1994). Bandura suggests that self-regulated learning arises when high levels of self-efficacy and transparent formative feedback coexist. Pape, Bell, and Yetkin-Özdemir (2013) add that feedback that leads to learners' self-evaluation and corrections increases self-efficacy. Strong self-efficacy supports the acquisition of effective study habits (Clarke, 2012) and has a strong correlation with a forward-thinking mindset and goal setting (Bandura, 1997); these learners are capable of assessing their work and making adjustments and improvements (Clarke, 2012). Efficacy beliefs affect the speed at which students acquire new knowledge, as well as how quickly they are able to evaluate, retain, and reformulate their ideas (Clarke, 2012). Higher levels of self-efficacy are also associated with students who choose more challenging tasks, are more persistent, more productive, and resistant to stress, anxiety, and depression (Zimmerman, 2000b). The benefits of high levels of self-efficacy extend beyond the individual. Bandura (1986) indicates that individuals with high self-efficacy can positively influence the learning strategies that their peers use.

Bandura (1994) highlights the important role that self-efficacy plays in motivation. Nisan (1992) argues that intrinsic motivation is not sufficient for students to become deeply engaged and to persist with most schoolwork in a pre-determined curriculum. Intrinsic motivation has limitations beyond school as well. Self-regulatory strategies are the key to strengthening engagement with tasks learners may not find engaging (Brophy, 2004) and a student's perceived self-efficacy is key to this – it influences their ability to persist with academic tasks (Clarke, 2012).

Developing as a self-regulated learner. Many students do not learn to self-regulate as learners very well (Zimmerman, 2002). A salient idea in the research on self-regulated learning

and to the overall focus of this research paper is that self-regulation as a learner is not a fixed personality trait and can be developed through instruction (McCombs, 1989), and continues to evolve over the span of a learner's lifetime (Butler & Winne, 1995). White and DiBenedetto (2017) remark that learners require a level of competency before they are able to use self-regulatory strategies without a model or teacher. It has been conceptualized as a set of skills that can be taught explicitly or a developmental process that can emerge from experience (White & DiBenedetto, 2017). One of these important skillsets is self-regulation of volition, the metacognitive knowledge that allows interpretation of strategy failure and “knowledge of how to buckle down to work” (Boekaerts & Corno, 2005, p. 206). Black and Wiliam (2009) indicate that volitional self-regulation is essential for students to be able to overcome threats to self-esteem and continue to participate actively in the learning process (growth track) as opposed to avoidance and withdrawal from the situation (well-being track). They contend that it “is important to help students to acquire positive volitional strategies so that they are not pulled off the *growth* track onto the *well-being* track” (p. 14). Refer to Table 2.1 for a list of characteristics that relate to self-regulated learners and corresponding strategies that support their development.

Developing and teaching self-regulated learning increases metacognitive knowledge and skill acquisition that promotes capable, lifelong learners (White & DiBenedetto, 2017). All models of self-regulated learning incorporate social dimensions of learning (Butler, 2015), where confidence develops initially from social sources like a teacher and shifts to individual control (White & DiBenedetto, 2017).

Table 2.1

Characteristics and strategies of self-regulated learning (Clarke, 2012).

Characteristic	Strategy
These are students who:	Students actively participate by:
Self-evaluate	Assessing quality or progress, e.g., checking work
Keep records and monitor learning	Taking discussion notes or compiling a list of errors
Seek help from adults	Seeking social help from teacher or parents/caregiver
Self-verbalize	Generating overt or covert prompts to guide learning
Adapt and invents new learning strategies	Using evidence to adapt and improve learning
Set goals and plan learning progression	Setting and prioritizing goals and sub-goals
Structure the learning environment	Choosing conditions which make learning easier
Manage time	Regulating progress to realize timely outcomes
Engage in peer learning	Seeking social assistance from peers
Use non-classroom resources	Seeking information, e.g., libraries, Internet, contacts
Are persistent and complete what they started	Maintaining activity despite difficulty or distraction
Regulate progress by using self-consequences	Giving self-rewards or sanctions based on outcomes
Memorize and rehearse information	Using recursive strategies designed to improve recall
Are self-aware	Being non-judgmentally aware of own shortcomings

There is a significant amount of evidence that indicates that characteristics that support self-regulated learning can be developed by interventions in core content areas, and conversely that an increase in self-regulated learning can increase students' ability to learn in these areas (Clarke, 2012), even for those who are considered to be 'at risk' (Pintrich & Zusho, 2002; Black & Wiliam, 2006). Teachers are pivotal in the process of modelling reflection and should "encourage pupils to reflect on the skills they are developing and, through the modelling of reflection, to take responsibility for their own learning" (Black & McCormick, 2010, p. 125). Researchers have explored ways of helping in key processes such as goal setting, time management, learning strategies, self-evaluation, self-attribution, seeking help or information, and self-motivational beliefs such as self-efficacy and intrinsic task interest (Zimmerman, 2002).

"Self-regulation is dynamic as learners continuously evaluate and adopt their performance against the standard or a modeled behavior" (White & DiBenedetto, 2017, p. 210). Educational standards can promote development of self-regulation through self-monitoring, formative assessment, self-evaluation, feedback, goal setting, and self-reflection (Bembenutty, White, & Vélez, 2015). Learners need help with at least three main tasks (a) gathering reliable data about their learning and associating those data with effects, (b) accessing learning strategies

that can be available to metacognitive control, and (c) opportunities to practice strategies to bring them to the point of automation (Winne, 2017).

Models of self-regulated learning. There are different models of self-regulated learning, though White and DiBenedetto's (2017) integrated model of self-regulated learning (see Figure 2.4) is particularly compelling because of its clarity and emphasis on feedback. It includes four levels of competency: observation, emulation, self-control, and self-regulation. The observation level is the first level of learning to self-regulate and consists of a teacher modelling standards, how to evaluate self-efficacy, how to choose strategies, and how to set goals and serves as a guide for students how to engage with self-regulation. The second level is the emulation level. Teachers provide continuous feedback, scaffolding, and modelling and ensure learners' self-efficacy is in check as they develop towards mastery. Once students experience self-efficacy, they can move into the third level: self-control occurs when a student engages in material with minimal support but requests support when needed. The final level is self-regulation, characterized by high levels of self-efficacy and the ability to adapt performance to novel situations and set even higher learning goals.

Within each of the competency levels, there are three phases: forethought, performance, and self-reflection. Phases are cyclical as each phase influences the next. The forethought phase involves feelings and thoughts of students preparing to learn and includes goalsetting and understanding self-efficacy. The performance phase consists of students selecting strategies, monitoring progress while working on tasks and includes metacognitive monitoring and attention focusing. The final phase is self-reflection where students attribute feedback to effort and strategies when the work is completed. Students will remain at different levels for different time periods and adjust based on feedback. Throughout each phase, learners' emotions and

motivations are influential (Butler, 2015). Learners can set goals to regulate emotion in a similar way to regulating cognition. Emotions and motivations become the objects when learners exert metacognitive control (Winne, 2017). According to Clearly & Callan (2018), the self-regulatory process is not finished unless a learner applies feedback in a future learning situation.

Early in my career I accepted a contract teaching Grade 2. I have currently been teaching Grade 7 for the past four school years, and in between I taught a few years that ranged between Grades 4 and 6. At each of these levels, it is clear that the best learners were the ones who were able to employ a range of self-regulation strategies and generally had high self-efficacy. It is also clear that ability for self-regulated learning develops over time. This is the result of a combination developmental processes, experience, and explicit teaching. As expected, students in Grade 2 were generally not as adept at self-regulation as students in Grade 4, who were generally not as adept as students in Grade 7. As a father of a toddler, I now also understand the importance and influence of life outside of school in the development of regulation and thinking processes that relate to self-regulated learning like reflection, monitoring, goal-setting, and development of self-efficacy.

Winne's (2017) three tasks learners need help with in self-regulation resonate. As with Chloe, who was discussed in a previous reflection, many students have difficulty connecting their learning and processes related to learning to their test scores or achievement levels on assignments. Others have difficulty selecting appropriate learning strategies, even though they are highly motivated to do well. Rachel's* experience with a unit test is a clear example of this. Though she was confident and had studied for multiple hours for the test, she ended up showing a very poor understanding in relation to the learning outcomes. She had not used effective study techniques, did not effectively rehearse and monitor her understanding of the information prior to writing the test, and experienced test anxiety, which affected her ability to concentrate during the quiz. I pulled her aside as I returned her test to let her know that I wanted to discuss the results with her. After discussions that included reflections about the strategies she had used and feedback intended to enable use of effective study strategies and strategies for dealing with test anxiety, she studied again, took an alternate version of the quiz, and demonstrated a high level of proficiency. The feedback given during the informal discussions seemed much more beneficial to her development as a self-regulated learner than her being left to interpret the feedback given in the form of the results of her quiz, though that feedback was still valuable as it was a clear indicator that she needed to change strategies. Rachel's experience is a clear example of how feedback can be given to support the development of self-regulated learning. With other opportunities such as future quizzes to practice these strategies, over time they will ideally result in internal feedback and come to a point of automation.

*Rachel is a pseudonym.

Figure 2.3 Reflections on models of self-regulated learning.

Discussion. This integrated model with its phases and competency levels clearly shows that feedback is an integral part of the development of self-regulatory processes. As White & DiBenedetto (2017) explain, “learning is a continual process of establishing goals and adjusting patterns of behavior to match those goals more closely by using feedback that can come from an external source, such as a teacher or an internal source through self-monitoring” (p. 213). Having learners regularly evaluate what they are capable of helps them see they have made progress and strengthens self-efficacy (White & DiBenedetto, 2017). It also highlights that feedback does not necessarily have to be external, and prescribed self-assessments that promote feedback from within can be important in developing self-regulating learners.

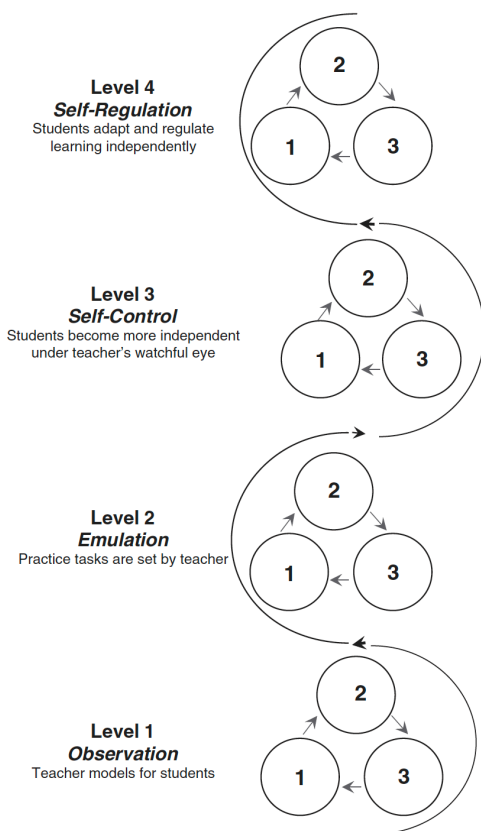


Figure 2.4 An integrated model of self-regulated learning including the three phases and levels of competency (White & DiBenedetto, 2017).

There was no training in my education degree on metacognition and self-regulated learning, though I am now convinced that both should be a focus for student development over the course of their formal education. Teaching reading strategies has become normalized; readers can benefit from learning about what successful readers do, the strategies they use, and how they think. Teaching metacognition and self-regulated learning is analogous, but on a broader scale, applicable and integrable in all aspects of the curriculum. The focus is on emulating what successful learners do, including the ability to select and use effective strategies and successful thought processes. The processes are modelled, practiced, and eventually become automated; completely integrated into a way of thinking. There are parallels between developing self-regulated learning characteristics including metacognition and British Columbia's assessment model of know, do, and understand. If developing metacognition and self-regulated learning are primary objectives, the curriculum is the vehicle to teach these meta-competencies.

My review of the literature validates taking the additional time required for modelling and thinking aloud, and also to focus on formative feedback, reflective practice, and developing in students the ability to explicitly practice generating internal feedback through activities like self-assessment. The literature also highlights the importance of self-efficacy for self-regulated learning. Because self-efficacy can be developed through formative assessment, I will continue to integrate formative feedback throughout my teaching practice and continue to develop my proficiency with it. As an example of formative assessment and feedback's powerful effects, I have experienced students redefining their self-efficacy and identity in the math classroom. Students use mini-whiteboards and are given immediate feedback working through practice questions as a group before moving onto completely independent tasks. Students who previously identified as non-math students gain proficiency and as a result increase self-efficacy, which is integral in self-regulated learning.

In my future practice, I plan to incorporate even more opportunities for self-assessment and reflection and also to attempt to provide more guidance in these activities through both informal feedback through conversations and written or audio feedback.

Figure 2.5 Reflections on the development of self-regulated learning and self-efficacy.

Overview of Feedback

Feedback has gained significant attention in education research due to its potential as a powerful catalyst for learning. Feedback, as with metacognition and self-regulated learning, can greatly impact the quality of learning in the classroom and develop students' ability to learn outside of the class, leading to the development of capable, lifelong learners. The effectiveness of feedback is likely a result, at least in part, of its interrelationship with metacognition and self-

regulated learning. According to Hattie and Timperley (2007), the average effect size of feedback on learning in 12 meta-analyses was 0.79, twice the typical effect of schooling in general and was among Hattie's top five to 10 highest influences on achievement. There is a strong link between feedback and the development of self-regulation, which has led some to express the main objective of formative feedback is to prepare students for college and life by giving them the self-regulatory strategies they need for self-control (e.g. Black & Wiliam, 1998) and others to claim that feedback is pivotal to self-regulated learning (Butler & Winne, 1995). Black and Jones (2006) indicate that the objective of formative feedback is the involvement of students in metacognitive strategies that support self-regulated learning. Butler and Winne (1995) express that, "for all self-regulated activities, feedback is an inherent catalyst" (p. 246) and learners use formative feedback to monitor engagement which generates internal feedback.

Feedback for learning. Hattie and Timperley (2007) describe feedback as, "information provided by an agent (e.g. teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding," (p. 81) that fills a gap between what is understood and what is aimed to be understood (Sadler, 1989). According to Hattie and Timperley's model, effective feedback must answer three major questions asked by a teacher and/or student: Where am I going? (feed up), How am I going? (feed back), and Where to next? (feed forward). In their model, feedback can operate on four different levels: task performance, process of understanding how to do the task, self-regulation, and the self or personal level. Feedback on process of understanding and self-regulation are of particular importance to the development of metacognition and self-regulated learning as both focus on supporting the development and use of learning and regulation strategies, which allow learners to provide themselves with feedback.

Ruth Butler's studies in the 1980s examining learning when students were given either grades, diagnostic feedback, or a combination of the two, are referenced extensively (Black, 2016; Boaler, 2016; Wiliam, 2017). Butler (1987) found that students who received feedback had significantly higher achievement than students who received grades. Surprisingly, students who received feedback and grades did no better than students who only received grades. Students who received grades and praise also did no better (Wiliam, 2017). These results have been replicated recently and the recent study also showed that students only need to believe they are working for grades to negatively impact achievement (Pulfrey, Buchs, & Butera, 2011). Hattie & Timperley (2007) indicate that there is considerable evidence that providing written feedback at the task level is more effective for performance than providing grades.

Feedback comes in many forms and to be powerful, it must address a learning context (Hattie & Timperley, 2007). Feedback is often given in written form, though Wiliam (2017) describes a number of methods of giving feedback including: students working through lessons with mini-whiteboards so the teacher can see and give feedback; oral communication; receiving a test back without any marking other than an indication that there are a certain number incorrect and the learner has to find and correct them; and only telling students whether their performance has gotten better, remained the same, or improved relative to the previous performance. Students should be given meaningful time in class to engage with the feedback; it will only serve formatively if the learner uses information fed back to him or her to improve performance (Wiliam, 2017). Engagement with feedback will be discussed further in another section.

Creating effective feedback can be challenging, as learners are complex and there are many variables. It is essential that feedback is targeted at the level of the learner (Hattie & Timperley, 2007). Hattie and Timperley (2007) discuss a review of feedback effects and note

that studies showing the highest effect sizes involve students receiving feedback about a task and how to improve. Feedback aimed at moving learners from task, to processing, and to regulation is the most effective (Hattie & Timperley, 2007). “Feedback should be focused on improving students’ performance on tasks they have not yet attempted, rather than on rendering judgments on the adequacy of previous performance” (Black & Wiliam, 2018, p. 10). In other words, “the main purpose of feedback is to improve the student and not the work” (Wiliam, 2018). Clarke (2012) suggests that if feedback is to develop both self-regulation and achievement, teachers need to plan questioning carefully and support the student’s self-efficacy; feedback must scaffold learning so the student feels like they are in control of their learning. Clarke continues, offering that over time, this feedback will generate internal feedback which will lead to more engagement, effort, and self-regulation.

Feedback should include appropriate, challenging, and specific goals (Hattie & Timperley, 2007), but not be too specific. It also should not be too vague or include concepts students may not understand. Learners should be required to do as much of the thinking as possible (Wiliam, 2017). Hints are likely to be more effective than giving answers because they require retrieval, which increases storage strength more (Wiliam, 2017). Highly prescriptive feedback can improve performance, but result in less learning as the teacher has done most of the thinking for the student. If the feedback is vague or the student is not able to understand it, it may be accurate, but of little help (Wiliam, 2017). Feedback should also relate to self-efficacy and to the task rather than being related to self-esteem or ego (Wiliam, 2017). Another factor for consideration is that there should be an appropriate balance between supportive and critical feedback, and the balance will depend on the individual (Wiliam, 2017). Feedback also should

not be given on everything students do — too much can be destructive (Hattie & Timperley, 2007; Wiliam, 2017).

A key insight from connecting the research on feedback and self-regulated learning is the importance of feedback at both the process and self-regulation levels. Initially, I did not fully understand Hattie and Timperley's (2007) remark that the best feedback moves the student from the task, to processing, to self-regulation. However, it now resonates after reading about self-regulated learning and its capacity to enhance learning. In my practice, the focus for giving feedback has generally been at the task level, which is effective for improving performance, though not necessarily as effective for long-term learning and developing self-regulation. Based on a review of research related to feedback I completed early last year, I have been attempting to include more process feedback and have been more mindful in asking myself whether the feedback is more about increasing performance or attempting to improve the student. I try to leave more of the thinking to the learner, though it can be difficult to get the optimal balance between encouraging thinking and ensuring the message is accessible and useful. With feedback related to reading responses, for example, in the past I may have written specific prescriptive language aimed at improving that particular response. Now, I attempt to include feedback that relates more to the process, such as encouraging students to think about how a character's action may have influenced the course of the plot or revealed understanding about another character. The next step in providing feedback that promotes self-regulation is to incorporate feedback that targets characteristics like those listed in Table 2.1 and attempting to give it in the different phases described by White and DiBenedetto (2017).

Reflecting about feedback at the self-regulation level provoked thoughts about the development of young children and how they rely on external sources for regulation. My son is almost three years old and the experience of parenting has allowed me to intimately observe and experience one way that self-regulation is developed. I have come to the realization that feedback has been key in the process. In clear Vygotskian fashion, development starts off as modelling, thinking aloud, and verbal feedback in response to actions that require regulation, just like in White and DiBenedetto's (2017) model, and over time this feedback becomes internalized to the point where he does not need the external feedback and eventually presumably will not consciously think about it in some cases. A specific example of this is when he was transitioning from diapers. Feedback was given on the process, but also aimed at the self-regulation level, including at the forethought, performance, and reflection phases. Over time, there must have been some form of internal feedback happening as he eventually became able to regulate himself.

To relate back to teaching and students' learning, I think the above example reveals how feedback at the self-regulation level can promote development of self-regulated learning by focusing on modelling and giving related feedback throughout the different phases, and over time it will ideally be internalized, generating internal feedback.

Figure 2.6 Reflections on the relationship between feedback and the development of self-regulation.

Feeding back from within. Butler and Winne (1995) note that:

For all self-regulated activities, feedback is an inherent catalyst. As learners monitor their engagement with tasks, internal feedback is generated by the monitoring process. That feedback describes the nature of outcomes and the qualities of the cognitive processes that led to those states. We hypothesize that more effective learners develop idiosyncratic cognitive routines for creating internal feedback while they are engaged with academic tasks. (p. 246)

Effective learners create their own feedback while performing academic tasks, while less effective learners have minimal self-regulation strategies and need more external regulation (Hattie & Timperley, 2007). The preceding quote aligns with White & DiBenedetto's (2017) integrated model of self-regulated learning development discussed in a previous section. Students who have metacognitive skills related to self-assessment can evaluate their understanding, monitor performance and strategies, evaluate improvement, correct mistakes, and plan where to go next (Hattie & Timperley, 2007). According to Clarke (2012), "internally generated feedback is inherent to engagement and regulation" (p. 213), and self-regulated learners generate more internal feedback than those who are less regulated (Bose & Rengel, 2009). Clark also indicates that "self-reflection is the heart of self-regulation" (p. 32).

William (2017) discusses one study (Fontana & Fernandes, 1994) where the effect size of learning when self-assessment was taught and integrated nearly doubled over a 20-week period. Teachers should help students to become more independent and self-regulating as learners and self-reflection is a means to achieve that goal (William, 2017). As Clarke (2012) offers, "efforts

to build self-regulation and autonomy begin with learners' partnership in the assessment and learning process" (p. 241).

There are many ways Wiliam (2017) suggests other than a formal reflection for students to become more aware of their thinking. For example, using coloured cups during a lesson: green represents full understanding, yellow signals the teacher is going too quickly, and red indicates that the student wants to ask a question. Other methods Wiliam describes include creating learning portfolios, where a student selects and reflects on pieces of work, and learning logs, which are quick reflections at the end of a lesson where students choose from a list of sentence starters to respond to.

Summative assessments can be used in conjunction with self-assessments where students reflect on strengths and weaknesses and help determine direction of future learning (Black & Wiliam, 2018). Practice tests give retrieval practice, improving long-term memory, and there is no additional benefit to recording the mark in the gradebook (Wiliam, 2017). Students mark their own test within the same period and get immediate feedback. This is beneficial as it can elicit the hypercorrection effect, where students who have high confidence in the accuracy of a response and receive feedback indicating an error more easily correct the error (Wiliam, 2017).

In the past few years in the math classroom I have begun to develop a system of self-assessment and reflection supports, which ideally help support the development of self-regulated learning as well. It starts with the use of mini-whiteboards during direct instruction lessons. Examples are modelled and then students work through examples on their whiteboards, hold them up, and then receive immediate feedback on their response. During lessons without mini-whiteboards, I typically have students use the fist-to-five assessment by holding up fingers to represent their perceived level of understanding. I have also used William's coloured cups described previously. These formative assessments ideally create internal feedback, which is essential for self-regulation. Another part of the system includes students completing practice tests before every quiz that are marked in-class by the student. Additionally, they are given time to seek help before the quiz if needed. Again, this hopefully provides a situation where students can monitor and generate internal feedback and then select a strategy for improvement. Finally, after the actual quiz, students complete a reflection with a variety of questions that are focused on their learning behaviours and strategies throughout the topic, how they perceive their performance, compare it to their actual performance, compare the practice test results and the actual test results, and plan future strategies for success. This system incorporates support for Winne's (2017) three main tasks that learners need help with to develop self-regulated learning discussed in a previous section: a) gathering reliable data about their learning and associating those data with effects, (b) accessing learning strategies that can be available to metacognitive control, and (c) opportunities to practice strategies to bring them to the point of automation (Winne, 2017). To improve the reflection sheet, I plan to list a number of viable strategies from which students can select. In my future practice, I plan to consider incorporating even more self-assessment and reflection into quizzes and tasks. For example, including a short reflection at the beginning, during, and at the end of an assessment could incorporate opportunities to practice self-regulated learning.

Figure 2.7 Reflections on using self-assessment to develop self-regulated learning.

Peers as a source of feedback. Peer assessment can also develop student ability to reflect on their own understanding. For example, they can compare their work to peers' and gain insight from them (Black, 2016), and peer interactions are also significant in the development of self-efficacy (Clarke, 2012). Boaler (2016) suggests that students are often more open to hearing criticism or a suggestion from another student, and peers usually communicate in ways that are easily understood by each other. Peer assessment has been shown to have a positive impact on learning (Topping, 2013), though to be effective, students need to have training (Black & William, 2018) and the teacher actively needs to develop and structure situations that will result

in success (Clarke, 2012). While there are no data from long-term studies, it is hoped that peer assessment can help develop self-regulation and other skills relevant to lifelong learning (Topping, 2013). Engagement with peers for feedback is a key self-regulated learning strategy in high achievers (Clarke, 2012). Peer assessment can also contribute to developing “positive interdependence” among the group, which is supportive of self-regulated learning development (Johnson & Johnson, 1998).

Emotions and Feedback

Emotions are complex, have a complex relationship with learning and feedback, and can significantly impact learning and performance (Pekrun, 2017). Until recently, research on emotions in education, including their relationship with assessment, has been neglected (Pekrun, 2017), though it has become one of the more salient topics in current educational research (Jackson, 2015). Little empirical evidence and few theoretical assumptions exist on the interplay between emotions and feedback, though this is changing (Goetz, Lipnevich, Krannich, & Gogol, 2018).

Emotions are complex, multicomponent coordinated processes of psychological subsystems which comprise an emotion-specific subjective affective experience or feeling, cognitive process, motivational tendencies, expressive behavior, and peripheral physiological processes (Vogl & Pekrun, 2016; Goetz et al., 2018). They have been found to consume cognitive, working memory resources (Ellis & Ashbrook, 1988), which can affect attention and performance. Positive mood can promote motivation to learn and increase performance, while negative mood can hamper motivation and performance (Olafson & Ferraro, 2001), though relationships and outcomes are often more complex. Emotions can function as mediators of the effects of achieving learning goals (Vogl & Pekrun, 2016).

Emotions are highly relevant to the topic of feedback, performance, and self-regulation and metacognitive processes. As D'Mello, Strain, Olney, and Graesser (2013) highlight, "affect states interact with every thought, modulate every decision, and influence every action, from the mundane to the elaborate" (p. 670). According to Fredrickson (2001), "positive emotions are worth cultivating not just as a state in themselves but also as a means to achieving psychological growth and improved well-being over time" (p. 218). This should be a consideration when interpreting the relationship between feedback and emotions, implications for the classroom, and the potential of developing metacognitive processes to moderate emotions. Stiggins' (2018) insight that successes and failures can result in positive feedback loops is relevant here.

Achievement emotions. Effects of emotions on achievement, as well as the effects of achievement on the development of emotions are linked by reciprocal causation over time (Pekrun, 2017). Achievement emotions, emotions that relate to achievement activities or achievement outcomes (Pekrun, 2006), including anxiety, frustration, shame, enjoyment, hope, and pride, and emotional responses to assessment can influence motivation, activation of cognitive resources, student performance, and learning behavior (Vogl & Pekrun, 2016), including self-regulated learning processes (Goetz et al., 2018). The social aspect of school and assessments can trigger emotions related to the self as well as other people including an agent giving feedback (Vogl & Pekrun, 2016), which could be a teacher or peer.

Achievement emotions differ in terms of valence (positive or negative), degree of activation (activating or deactivating), and their object focus (activity or outcome) (Vogl & Pekrun, 2016; Pekrun, 2017; Goetz et al., 2018). All may be relative to feedback (Goetz et al., 2018).

According to Pekrun's (2006) control-value theory, there are two main groups of appraisals that are especially important in mediating achievement emotions that have been studied: subjective control (e.g. studying will lead to success) and subjective value (e.g. importance of success). Appraisals are proximal antecedents of emotions (Pekrun, 2017). Of significance, is that Pekrun's control-value theory posits reciprocal causation over time between emotions, their antecedents, and effects and therefore feedback loops can be important.

Goal theories, alternately, emphasize goal interruption as a key appraisal dimension with arousal influenced by the size of interruption and valence determined by the appraisal of the interruption (D'Mello et al., 2013). With goal theory, outcomes that achieve challenging goals result in positive emotions whereas negative emotions result from goals that are at risk. Goal theories emphasize the importance of emotion on self-regulation and posit that emotions can help direct selection of learning strategies (D'Mello et al., 2013).

Positive achievement emotions. Positive emotions can, as one would expect, have benefits on student performance, though they may also negatively affect performance. Activating emotions like pride and hope, can have beneficial effects on attention, motivation (Ainley & Ainley, 2011), use of learning strategies, and development of self-regulation of learning through increase of flexible thought and action (Pekrun, 2017). Deactivating positive emotions can reinforce motivation to reengage with learning (Pekrun, 2017). Curiosity and enjoyment can also direct attention to performance tasks and promote intrinsic motivation (Pekrun, 2017). However, positive emotions that do not relate to learning can affect attention and lower performance (Pekrun, 2017). Positive emotions typically foster achievement while negative emotions hinder it, while controlling for other variables (Pekrun, 2017).

Negative achievement emotions. Negative reactions to assessment are reported more frequently than positive ones, with anxiety being the most reported (Vogl & Pekrun, 2016). Activating negative emotions like anxiety, shame, and anger have complex effects (Vogl & Pekrun, 2016), and can both reduce interest and flexible thinking and promote avoidance of failure (Pekrun, 2006). Negative emotions can draw attention away from learning (Pekrun, 2017) and therefore negatively affect performance. Deactivating negative emotions like boredom and hopelessness undermine attention, motivation, and strategy use (Pekrun, 2017). Negative emotions also undermine self-regulation of learning (Pekrun, Goetz, Frenzel, Barchfeld, Perry, 2011).

Interplay between emotions and feedback. “Feedback and emotions are omnipresent in education” (Goetz et al., 2018, p. 554). Performance feedback likely has primary importance for achievement emotions (Vogl & Pekrun, 2016) and emotions play a pivotal role in feedback (Goetz et al., 2018). “Affective response is not a side effect or epiphenomenon of the feedback, but rather the underlying mechanism by which feedback influences behavior” (Fishbach, Eyal, & Finkelstein, 2010, p. 523). The above achievement emotions may come into play when experiencing feedback.

In control-value theory, feedback is an antecedent of emotions, affecting achievement outcomes and future receptivity to feedback (Goetz et al., 2018). Feedback can trigger strong emotions which could affect engagement with feedback and future learning behaviour and outcomes (Goetz et al., 2018; Lipnevich, Berg, & Smith, 2016; Pekrun, 2006).

As with emotions, emotional reactions to feedback are complex. Initial evidence tends to show that positive feedback is generally related to positive emotions and negative feedback is

related to negative emotions, though it is not always clear what is positive or negative in nature and differential receptivity depends on many variables (Goetz et al., 2018).

Presentation and type of feedback. How feedback is presented and its perceived value can affect the emotional response. Stiggins (2018) suggests that too much feedback at a given time can overwhelm. High stakes feedback is much more likely to produce anxiety than low consequence feedback (Lipnevich et al., 2016). Valence of feedback and emotions plays an important role in their relationship: positive feedback is generally related to positive emotions and negative feedback is related to negative emotions (Goetz et al., 2018). For Lipnevich et al., (2016) the tone of the feedback is regarded as the most critical aspect with regard to emotional reaction.

The type of feedback also affects emotions. Receiving a grade over written comments has been shown to increase student ratings of negative emotions and reduced pride (Goetz et al., 2018). In one study (Lipnevich & Smith, 2009) the mere presence of grades was demonstrated to have a negative effect on affect and on performance. Interestingly, in the same study, the inclusion of praise as part of the feedback lowered motivation.

It happens every year. There is always at least one student who comes into my classroom identifying as an “A student” and when they receive a grade that is less than an A, they feel upset, hopeless, shamed, or are in disbelief. I remember their reactions clearly. The guarded way they look, the discouraging remarks made to the peers like, “I guess I’m a C+ student now,” and the deflated sense of enthusiasm. For these students, grades are part of their identity and this contributes to their negative reactions.

Emotional responses to feedback are an aspect of teaching that has bothered me since I started teaching and a reason that I often do not enjoy handing back work that has been marked. I do not wish to instill these negative feelings and responses in my students and consider the potentially damaging effects they can have on my relationship with the students or the extinguishing of interest and enthusiasm for a topic. In an attempt to counter these potential outcomes, I try to make my evaluations clear and transparent and involve students in the assessment process by making the criteria and marking part of the lessons. As I am crafting feedback, I often think about how students will respond, especially when the achievement level does not match their typical one.

In British Columbia’s new curriculum and assessment focus, there is a move away from grades to descriptive achievement indicators, though I have found that similar reactions still exist. Instead of an A being the highest level of achievement, it is now “extending”. There are some students who become disappointed when they do not achieve an extending, because they want to be at the highest level, either as a result of internal or social pressures. It is possible that as students become more used to the new paradigm, they will be more focused on the competencies required to achieve a certain level of proficiency.

A few strategies I have tried to mitigate these negative effects include sharing examples of previous students’ work and, when possible, discussing the feedback face-to-face. I have found that when I have a conversation with students, they are able to ask more questions, I can bring in specific examples, and it is almost as if they can see that I am pulling for them to reach the next level. Winne (2017) indicates that emotions can be regulated in a similar way to cognition, and explicit teaching about this and providing feedback throughout the phases may help students learn to regulate them in a more adept way. In the future I plan to incorporate more explicit teaching and modelling in this area.

Figure 2.8 Reflections on the connection between grades, identity, and emotions.

Perceptions of the feedback provider. The receiver’s perception of the feedback giver can also influence the response. Stiggins (2018) argues that a student’s mental state often depends on their relationship with the teacher at the time the information is shared. Johnson & Connelly (2014) surmise that emotions of the feedback provider and emotions of the feedback receiver interact through emotion transmission process.

Moderators and mediators of the relations between feedback and emotions. There are several moderators and mediators that can significantly influence the relationship between emotions and feedback bidirectionally (Goetz et al., 2018). Moderators affect the strength of the relationship, whereas mediators are theorized causal influences. By changing the dynamics of moderating and mediating variables through interventions such as enhancing metacognition and self-regulated learning strategies or considering mediators such as appraisals of control when creating and giving feedback, it may be possible to decrease the negative effects of negative feedback on emotions (Goetz et al., 2018).

Moderators of relations between feedback and achievement emotions. Moderators with a reciprocal relationship between feedback and emotion include the level of generalization of feedback and the academic domain (Goetz et al., 2018). Relations are stronger when feedback and emotions are more specific to an academic domain compared to more general. For example, math feedback and math emotions would be expected to have a stronger relationship when compared to GPA and school-related emotions (Goetz et al., 2018). This could be another argument for using more feedback related to process and self-regulation for students who may have strong emotions related to a particular domain. The strength of relations between emotions and feedback is also likely moderated by the academic domain, though results are inconsistent (Goetz et al., 2018).

Variables that moderate the effects of feedback on emotions include personality variables, emotion regulation, and the purpose of feedback. Feedback-seeking people, for example, experience more pleasant emotions and lower unpleasant emotions than feedback-avoiding people. The purpose of feedback can also moderate feedback's effects on emotions. For

example, formative feedback or task-focused rather than self-focused feedback may promote more positive emotions or reduce the impact of negative ones (Goetz et al., 2018).

Metacognition has the potential to reduce negative emotions following negative feedback and moderate the effects (Sargeant, Mann, Sinclair, Van der Vleuten, & Metsemakers, 2008). Emotion regulation, including reappraisal (thinking about a situation to change its emotional impact), also has the ability to moderate the effect of feedback (Goetz et al., 2018). Both metacognition and emotion regulation are key aspects of self-regulated learning, as discussed in a previous section.

Mediators of relations between feedback and achievement emotions. Attitudinal reactions on feedback, action tendencies, and behavior mediate between emotions and feedback (Goetz et al., 2018). Attitudinal reactions have included reduction in liking of the feedback giver, lowered perceived ability of feedback provider, and reduced feedback acceptance in the presence of negative feedback. Feedback on achievement activates an “emotional feedback system” and impacts subsequent behaviour, though currently, little empirical evidence exists for causation (Goetz et al., 2018).

There are two main mediators acting between feedback and emotions: cognitive appraisals and achievement goals (Goetz et al., 2018). Appraisals of control (e.g., expectations, attributions) and value (e.g., intrinsic and extrinsic) operate an effect on emotions and can depend on the type of feedback. High levels of control align with positive emotions. Value influences both positive and negative emotions. Feedback operates on appraisals of control and value, which have an effect on emotions. Again, little empirical data exists, but what there is supports the connections discussed (Goetz et al., 2018).

With respect to the mediating effect of achievement goals, self-referential feedback should promote mastery goals (e.g. “This term, I want to learn as much as possible”; Cury, Elliot, Fonseca, & Moller, 2006, p. 669) which should have a positive effect on activity emotions (Vogl & Pekrun, 2016). Performance-approach goals (e.g. “This term it is important for me to do better than other students”; Cury et al., 2006, p. 669) should have effects on positive outcome emotions related to success by focusing on controllability and positive values (Vogl & Pekrun, 2016). Performance-avoidance goals (e.g. “My goal this term is to avoid performing worse than other students”; Cury et al., 2006, p. 669) should affect negative-outcome emotions related to failure by focusing on uncontrollability and failure (Goetz et al., 2018; Vogl & Pekrun, 2016).

Though not directly addressed in the literature on emotions and feedback, self-regulated learners select and use strategies, make cognitive appraisals that are productive for learning, and have high self-efficacy, all of which likely play a key role in influencing or reframing potential moderators and mediators discussed in the previous section. For example, rather than have attitudinal reactions such as negative feelings toward the feedback giver, a self-regulated learner would likely interpret the same feedback as beneficial to their mastery goals and be better able to reappraise any negative emotions that may arise.

Relationships can also be a critical aspect that can influence the emotional response to feedback. As Stiggins (2018) points out, the mental state of the student often depends on the current relationship between the teacher and student at the time the information is shared. This has implications for the type of feedback, how it is presented, and the timing of the feedback. It is also more support for the importance of developing relationships with each student. With some students, regardless of the presentation or content, feedback may be perceived as negative unless there is some form of connection with the teacher. This could be based on their prior academic experiences or feelings towards people in an authority position in general. The student’s cognitive appraisals and values could be influenced by their perceived strength of the relationship with the feedback provider. For example, the student may perceive even negative feedback as a way to help them because they feel the teacher cares for them rather than feeling the teacher is putting down the work. I have had experiences with a few students when it takes months of effort to develop a strong working relationship. Once that is in place, then a more open dialogue begins to happen and I can understand and alter the balance between critical and positive feedback, predicting more accurately what kind of reaction it may bring.

Figure 2.9 Reflections on influencing the effects of mediators and moderators between emotions and feedback.

Emotion regulation. Because emotions are so influential in academics, students should be equipped with strategies for regulating them and moderating their effects (D’Mello et al., 2013). Many believe that when students are given formative feedback, it helps them to regulate emotion in addition to cognition and metacognition (Black & Wiliam, 2009; Butler & Winne, 1995; Nicol & Macfarlane-Dick, 2006; Schunk, 1998; Zimmerman, 2000b). Emotions can be regulated through meta-affective processes, a corollary of metacognition and related to self-regulation, according to Schwarz’s (2012) feelings-as-information theory, though empirical data is sparse (D’Mello et al., 2013). In this theory he posits that different feelings convey different types of information. For example, hopeless confusion can indicate a knowledge deficiency. These feelings can be used to moderate learning, help with decisions, and influence processing strategies.

Affect regulation is a new field of research that explores how people regulate their emotions either before or after they occur (D’Mello et al., 2013). A goal of emotion regulation is to downregulate negative emotions and upregulate positive ones (D’Mello et al., 2013). Gross (2008) outlines broad emotion regulation strategies including attentional deployment (e.g. distraction involving avoiding elements that might induce negative reactions), cognitive reappraisal (actively changing perceived meaning of a situation, for example reframing negative feedback in a positive way), and response modulation (sustained effort to minimize expression of emotional behaviour, including breathing deeply or taking a walk). These strategies require metacognition and self-regulated learning, as the learner must first be aware of the emotion and its connection to cognition, and then select an appropriate strategy that is beneficial for learning.

Engaging with Feedback

Proactive recipience. “If information is simply stored in memory and never used, it is not feedback” (Orsmond, Merry, & Reiling, 2005, p. 381). The qualities of effective feedback and its transmission have been theorized extensively and recommendations for practice abound (e.g. Hattie & Timperley, 2007; Shute, 2008; Black & Wiliam, 2018). It is, however, “equally important to understand how learners actively receive, engage with, and implement feedback” (Winstone, Nash, Parker, & Rowntree, 2017, p. 17). Winstone et al. (2017) refer to these responses as proactive recipience, emphasizing the responsibility and contribution of the learner in the feedback process. This aligns with a major tenet of self-regulated learning: active participation is fundamental (Clarke, 2012). As cited earlier in this work, Zimmerman (1989) refers to self-regulated learning as the degree to which students are “metacognitively, motivationally, behaviorally active participants in their own learning process” (p. 329). It is generally accepted that learners’ engagement with the feedback process is poor – and also that for feedback to be effective, it must be used (Winstone et al., 2017).

The benefits of using feedback extend to opportunities to develop self-regulated learning and metacognition (Schunk, 1998; Bandura, 1997) and research shows that transparent feedback is a critical aspect of processes that comprise self-regulated learning (Clarke, 2012). Black and Wiliam (2006) suggest that independent use of high-level feedback helps students “develop an overview of their work, so that they manage and control it; in other words, they develop their capacity for meta-cognitive thinking” (p. 15). Self-regulation enables learners to put effort into improving performance (Harlen, 2006), which can promote the use of feedback. This improved capacity for self-regulation and metacognition through the use of feedback and feedback’s role in

providing opportunities to develop metacognition and self-regulated learning is a central claim of this literature review.

Despite the many resources available to educators that focus on creating quality feedback, guidance for transforming learner behaviour from passive reception to active engagement, and even feedback-seeking is scarce (Jonsson & Panadero, 2018; Winstone et al., 2017). This is likely because research on the topic is limited, though the issue is gaining more attention (Winstone et al., 2017). Much of the information in this section relates to studies based on post-secondary students because of the limited availability of research with other populations. This is an important consideration when attempting to apply the findings to younger learners; however, it is reasonable to posit that the frameworks and ideas derived from research with students in higher education likely apply to some degree with younger students. Further research in this area is warranted and necessary.

The quality of students' engagement with and application of feedback are critical elements in its effectiveness (Jonsson & Panadero, 2018). Unfortunately, there is a lot of evidence that suggests students' engagement with their feedback is often not productive, either because they do not read it or do not act on it (Jonsson & Panadero, 2018). Jonsson (2013) suggests a number of challenges that may result in students' lack of engagement with feedback: it may not be useful; there may be a conflict between the student's preference for a type of feedback and the type that is productive; the tone may be too authoritative; students may not understand the terminology; and students may not have the strategies for using feedback productively. Potential specific moderators of learners' proactive recipience and potential interventions for increasing agentic engagement will be discussed, though metacognition and

self-regulated learning processes likely play a key role in the effects and outcomes of all of these moderators.

Many teachers, including me, have experienced the following situation at some point in their careers. After spending many hours crafting detailed, written feedback on an assignment, a number of outcomes have occurred that have included students not reading the feedback, seeing the same errors in future assignments, and students focusing on an achievement indicator such as a grade or proficiency level and ignoring the comments. This left me reconsidering the value of the practice. I knew that feedback was important, but also recognized that for it to be useful, it had to be used.

Given this tension, I began to change how I give feedback. As an example, I now embed feedback into the workflow for some assignments. In these cases, students submit an initial draft and are then expected to improve the draft based on the feedback. Grades and proficiency levels are not included at this point. In addition to feedback from me, students also receive feedback from their peers. As Black (2016) and others have suggested (and discussed in a previous section), I have found that students need training on how to give feedback rather than just fix all their peers' mistakes. Though there are still some students who do not use the feedback effectively, which can be due to a myriad of variables discussed in this section of the paper, I feel validated in making these changes after reading the research, not only from the perspective that the feedback is improving performance and ideally improving learning, but that their use of the feedback supports the development of self-regulated learning.

This is an area on which I will continue to build in my future practice, understanding the importance not only to building proficiency within a subject area, but also the importance of students engaging with the feedback to gain the benefits of developing self-efficacy, metacognitive skills, and self-regulation.

Figure 2.10 Reflections on engagement with feedback.

Moderators of engagement with feedback. There is an equal importance of both the sender and receiver in ensuring that communication occurs and is effective with feedback (Winstone et al., 2017). A number of potential moderators can influence proactive recipience, including sender variables, receiver variables, variables that relate to the message, and variables that relate to the context of the feedback. Winstone et al. (2017) indicate that evidence for each potential moderator is limited, so caution is required when reading the following; however, the combined research gives strong cause to believe these moderators affect engagement with feedback. These variables do not act in isolation; they interact within a system of emotional

moderators and mediators and other potential variables as well. How a student receives the feedback both affectively and cognitively can influence engagement and the first reaction can be either emotional or cognitive (Lipnevich et al., 2016). A previous section in this literature review discusses emotional responses to feedback.

Sender variables. Characteristics and behaviour of the feedback sender can influence learners' engagement with it. Students are unlikely to engage with feedback if they believe the sender lacks certain characteristics (Winstone et al., 2017). Trust and the perceived credibility of the teacher are important for engagement (Jonsson & Panadero, 2018), as is whether the teacher is liked, antagonistic, or perceived as untrustworthy (Lipnevich et al., 2016). Jonsson & Panadero (2018) discuss a study (Bing-You, Paterson, & Levine, 1997) where medical students found the following to be influential: trust and respect, level of knowledge, students' observation of sender behaviour (e.g. attention or uneasiness). Feedback is judged as more accurate if perceived from a credible source and an imbalance of power may result in learners adopting a passive role (Winstone et al., 2017). Peer assessment is also affected by these variables (Jonsson & Panadero, 2018).

These ideas about sender variables highlight the importance of developing strong relationships with students, or at the very least relationships with mutual respect and trust. Knowing my students, developing trust, and demonstrating that I am reliable have been a priority throughout my career. I value the relationships with the students and feel they are a significant contributor that make the job rewarding. Until this review of the research I did not consciously connect emotional responses to feedback, discussed in a previous section, and proactive reciprocity to my relationships with my students and my current awareness has implications for my future practice. I will continue to prioritize the development of trust and relational suasion, with more support for doing this. I will now also reflect on the perceived strength of the relationship with the individual student when giving feedback. This could potentially influence the level of detail and manipulation of other message variables described in the section below. For example, I may give more feedback to a student with whom I perceive that I have a strong relationship, because I know there is a higher probability that particular student will consider the feedback and act on it.

Figure 2.11 Reflections on sender variables and the importance of relationships.

Receiver variables. Each student may react differently to the same feedback (Lipnevich et al., 2016). “Some students are going to be generally more or less receptive to feedback, while others may react unpredictably and possibly inconsistently depending on the context and the nature of the feedback” (Eva et al., as cited in Lipnevich et al., 2016, p. 179). Lipnevich et al. (2006) refer to this idea of general receptivity as one potential variable affecting engagement. Evidence suggests that learners with high self-efficacy, good self-regulation, high achievement, and positive academic concept are most likely to engage with feedback; however, there are exceptions and, in some cases, theoretical conclusions rather than empirical research that warrant caution and further research (Jonsson & Panadero, 2018).

State vs. trait. Lipnevich et al. (2016) posit that making a distinction between state-based responses, those that are transient and situation specific, and trait-based responses, those that are more typical, is helpful in understanding how individuals engage with feedback. Trait-based responses are likely impacted by subjective beliefs, though past abilities, prior successes, and general receptivity to feedback are all relevant (Lipnevich et al., 2016). An increased ability in self-regulated learning would positively influence a student’s interpretation, framing, and/or utility of each of these.

Emotions and coping strategies. Pekrun’s (2006) control-value theory explains how engagement with feedback may be affected as a result of emotions. Refer to the sections on positive and negative achievement emotions for more details. Lipnevich et al. (2016) suggest that general coping strategies also determine whether and how a student engages, and these are linked to their personality, life, and academic achievement. Examples of general coping strategies include being problem-focused, like resolving the root cause of a stressful situation and

improving performance, or emotion-focused where the goal is to reduce stress. Emotions and emotional responses to feedback are discussed in more detail in a previous section.

Comprehension. The students' ability to understand the feedback is necessary for proactive recipience (Winstone et al., 2017). Students also require a clear understanding of the purpose, potential benefits, and their responsibility in the process (Jonsson & Panadero, 2018; Lipnevich et al., 2016). The more students understand the feedback, the more likely they are to have a positive response (Lipnevich et al., 2016) and show more engagement with it as a result.

Academic skills and experiences. Self-regulated learners should be able to make better use of feedback (Nicol & Macfarlane-Dick, 2006). In one study, high achievers reported engaging in self-assessment and setting targets for improvement based on feedback, while low achievers read feedback multiple times but did not plan to use it in the future (Orsmond & Merry, 2013). Lipnevich et al. (2016) indicate that prior success sets the stage for how current feedback is received by the student, and prior results of implementing feedback can also influence future use (Winstone et al., 2017).

The relationship between engaging with feedback and achievement is not always positive (Winstone et al., 2017). Clarke (2012) indicates that tacit knowledge influences how feedback is processed and may even distort the message. Matches or mismatches between student expectations and feedback can affect how it is acted on (Lipnevich et al., 2016). Similarly, expectation discrepancies related to grades can result in either high or low engagement and the student focusing on the grade rather than the feedback (Winstone et al., 2017). Grades often trigger disappointment which may reduce future engagement (Jonsson & Panadero, 2018). A learner's proficiency with help-seeking behaviour (instrumental vs. seeking direct answers) may also be important to engagement (Hattie & Timperley, 2007).

Identity. Positive and negative academic concepts factor into proactive recipience. Students with a positive self-concept are more likely to invest time in engaging with feedback (Baadte & Schnotz, 2014). Self-efficacy is also important in feedback situations (Hattie & Timperley, 2007). Handley, Price, and Millar (2011) suggest that higher self-efficacy results in greater belief in ability, so students are more willing to expend the effort on engaging with feedback. If a student has higher self-efficacy, they are more likely than non-self-regulated students to increase effort after receiving feedback on a substandard performance (Clarke, 2012). Wiliam (2017) indicates that whether a student has tendencies toward growth or fixed mindset is relevant to engagement, with the implication that those with a growth mindset would be more likely to engage with and attempt to use feedback. Though they do not specifically mention feedback, Blackwell, Trzesniewski, and Dweck (2007) indicate that those with a more incremental theory of intelligence focus more on learning goals (goals for improving ability) and are willing to expend effort and select productive strategies. As discussed in a previous section, self-efficacy is an important aspect of self-regulated learning.

I remember conversations from early in my career with veteran teachers discussing feedback. I was surprised to hear how the amount of feedback they gave depended on who they were giving it to and I remember feeling uneasy with this. At the time, my focus for creating feedback was more product- and task-centric, isolated from the learner, with objectivity the guiding influence. The feedback was written for a broad audience, essentially anyone who could possibly be reading it. The individual learner did not really factor into the composition of the message, even though my motivation for providing the feedback was to improve the learner. The research seems clear that there are many potential variables related to the receiver that can affect how or if they use it and that by differentiating the amount of feedback, the veteran teachers may have been increasing the chances it would actually be used. One of the more salient conclusions from this is realizing the importance of knowing and understanding the students you teach. In addition to the many other reasons, it also appears to be important for giving feedback that has the most likely chance of being used. Practically, this could look like giving students with a known higher self-efficacy or those who are clearly more advanced self-regulated learners more feedback in general, and more negative feedback, because the likelihood of them interpreting it in a useful way and engaging with it is higher. It also might mean distilling the message or providing additional context so that students are able to readily understand it.

Figure 2.12 Reflections on personalized feedback.

Message variables. The characteristics of the message can affect proactive recipience.

Level of detail. The amount of feedback can influence engagement, and quality is seen to be more important than quantity (Winstone et al., 2017). Some learners can become overwhelmed by large amounts of feedback (Nicol & Macfarlane-Dick, 2006). However, there is the potential that the feedback may not be used if it is unclear or insufficiently detailed (Winstone et al., 2017) so it is important to attain an optimal balance.

Content. Many aspects of how feedback is composed (e.g. concise or extensive, specific or vague, individualized or general, positive or critical, focused on content or structure, personal or neutral) have not been systematically tested with respect to student engagement (Jonsson & Panadero, 2018). Accuracy is important as students who perceive that feedback is inaccurate may engage less (Jonsson & Panadero, 2018). Honesty is also a factor. For example, if a student receives feedback that they are doing a great job when it is clear they are not, all future feedback

may be called into question (Lipnevich et al., 2016). Nicol and Macfarlane-Dick (2006) suggest that feedback is more likely to be used if it offers corrective advice rather than simply judging the accuracy. As discussed in a previous section, process feedback has greater use than task feedback (Hattie & Timperley, 2007), though if students are engaged with improving one particular assignment, task-specific feedback may be more desired (Jonsson, 2013). Jonsson (2013) suggests there may also be a conflict between what students prefer and what is productive for learning. Bandura (1997) suggests that the message should be de-personalized and that social comparison should be de-emphasized in order to protect self-efficacy, which likely influences engagement with feedback.

Tone. The tone of the feedback can also be a significant variable affecting engagement, and is the most critical to emotional reaction (Lipnevich et al., 2016). Un-motivational, unconstructive, authoritative, or insensitive tones are ineffective (Jonsson, 2013; Jonsson & Panadero, 2018). Jonsson (2013) suggests avoiding insensitive tone, using imperatives, and using mainly evaluative comments. Winstone et al. (2017) discussed how the level of education can affect engagement with respect to tone and gave the example of how school seniors were less dependent on a positive tone than juniors were.

Timing. Timing can affect receipt of feedback. Zimmerman (2002) suggests that untimely interventions result in negative internal feedback because students may interpret it as attempts at control or indicate assumptions about their ability. Winstone et al. (2017) suggest that students typically engage less if they have to wait longer for the feedback. However, Lipnevich et al. (2016) indicate that a distinction can be made depending on the difficulty of the task. They suggest that delayed feedback may be better to promote transfer of learning, especially with tasks that are attempting to develop conceptual understanding. Alternately, immediate feedback may

be more effective for tasks that involve procedural skills. However, there are conflicting findings in the research (Shute, 2008) and therefore it is difficult to produce firm guidelines.

Message format. Feedback can be delivered in a multitude of ways, including drawings, symbols, markings in rubrics, multimedia, annotations in margins, and narratives (Jonsson & Panadero, 2018). It is likely the format of the message influences learner engagement and this may be highly individualized.

Clarity and wording. Comprehensibility, accessibility, ability of student to process, and appropriateness of feedback can affect engagement (Lipnevich et al., 2016). Many students have difficulty understanding tacit language and academic terminology and this can be a barrier to using the feedback (Winstone et al., 2017; Jonsson & Panadero, 2018).

Context. Yang and Carless (2013) express that there is an interplay between the content of feedback, social and interpersonal negotiation of feedback, and organization and management of feedback. The context of the feedback can act as a moderator for proactive recipience. For example, many learners believe they have insufficient training for using feedback (Winstone et al., 2017). Modular design of courses can also affect engagement with feedback as students may feel they are not able to or required to apply the feedback and it is therefore irrelevant (Blair, Curtis, Goodwin, & Shields, 2013). High consequence or high-stakes feedback is much more likely to produce anxiety than low consequence feedback, and assessments have consequences for students which can affect how students receive the feedback (Lipnevich et al., 2017). If feedback is accompanied by grades or marks, students will often focus on the grade rather than the feedback (Winstone et al., 2017). Receiving a low grade can negatively affect self-esteem while receiving a high grade can result in the student not processing the feedback due to

satisfaction with the grade (Brown, 2007). According to Jonsson and Panadero (2018), current research suggests grades may be one of the major barriers to using feedback.

Although the context of grades and feedback is discussed previously in another reflection, I will revisit the relationship between them in this reflection, but with a different focus. Ben* was a bright seventh grader and academic work generally came easy for him. He often received A's on assignments and tests. He had a high self-efficacy in all subject areas, though had little motivation to improve assignments because they were already, in his mind, at the highest level of achievement. Ben was a clear example of a student who looks at the grade and disregards the feedback, and how for many students, a grade attached to the work signals the end of the learning process. This also illustrates that self-efficacy, though important to self-regulated learning, is just one aspect of developing as a learner.

Ben's recipience of feedback developed over time. After conversations with him about putting the achievement level into context, he became more receptive to engaging with and applying feedback. We had discussed how the A represented mastery at the Grade 7 level and how accepting this and not improving his learning limited his potential in relation to a wider context. He came to understand that the purpose of the feedback was to push his learning to the next level, and as a result became more receptive to it.

Though there is merit to Jonsson and Panadero's (2018) assertion that grades may be one of the major barriers to using feedback, I continue to see the value in providing achievement levels, though I would argue that the achievement levels should be well defined. They are beneficial to learners, parents, and teachers as a way to measure progress if they are used in a certain way. From the perspective of developing self-regulated learning and metacognitive skills, transparent performance information is important (Bandura, 1997) and others such as Pintrich (2000) note the importance of a criterion or standard against which comparisons can be made so the learner can assess whether to continue as is or make a change. Learners compare the achievement level with their perceived achievement level, generate internal feedback, monitor, reflect, and select strategies for future action. Perhaps if the focus of the achievement levels were reframed to emphasize a more formative approach, and the accompanying feedback was more process-focused, students would engage with it more. With an increased ability in self-regulated learning, I think the distinction between formative and summative becomes less of a factor in engagement levels with feedback. I think of my own experiences and how I appreciate feedback that moves my learning forward, regardless of whether a grade is present, but also find an achievement indicator like a grade as a valuable benchmark for reflecting on potential changes for future tasks.

*Ben is a pseudonym.

Figure 2.13 Reflections on grades and recipience of feedback.

Facilitating proactive recipience.

Taxonomy of recipience processes. From their review of interventions intended to promote proactive recipience, Winstone et al. (2017) created a taxonomy of recipience processes. Many rationales for the interventions they examined overlapped based on higher-order skills and processes that were targeted. Winstone et al. synthesized four distinct processes from these findings that support and promote proactive recipience: self-appraisal, assessment literacy, goal-setting and self-regulation, and engagement and motivation (SAGE). Each of these processes are clearly rooted in elements of self-regulated learning and metacognition. Significantly, Winstone et al. indicate that, “it is plausible that receiver, sender, message, and context variables would moderate learners’ development of SAGE processes and would be reciprocally influenced by the development of these processes” (pp. 33-34).

Self-appraisal. This process refers to judgements about oneself including traits and behavior (Winstone et al., 2017). Self-appraisal should support proactive recipience by enabling learners to become more actively engaged in assessing themselves and reduce their reliance on external sources. Winstone et al. (2017) mention studies that support the notion that self-appraisal can help develop a questioning approach to learning and support transfer of learning.

Assessment literacy. Assessment literacy includes processes of understanding the assessment process and applying this understanding to make judgements of work and performance (Winstone et al., 2017). It should support proactive recipience by “enabling the learner to (a) understand relation between assessment and learning and what is expected of him or her; (b) appraise one’s own and others’ work against criteria; (c) understand terminology and concepts used in feedback; (d) know suitable techniques for assessing and giving feedback and when to apply these techniques” (Price, Rust, O’Donovan, Handley, & Bryant, as cited in Winstone et al., 2017, p. 25).

Goal-setting and self-regulation. Goal setting is the process of “explicitly articulating desired outcomes” (Winstone et al., 2017, p. 25), which requires goal directed behavior, contributing to the development of self-regulation. Self-regulation, described in a previous section in more detail, requires monitoring, evaluating, and adjusting strategies. These processes should support proactive recipience by creating a feedback loop between goals, monitoring, and adjusting behavior.

Engagement and motivation. These processes of the taxonomy include being open to and receptive to feedback, being ready to engage with it, and paying attention to it. They should support proactive recipience by enabling learners to want to engage with and understand their feedback.

Interventions and applications. Winstone et al. (2017) discuss intervention component categories and organize them into the four clusters of studies shown in Table 2.2. These interventions aim to target one or more of the recipience processes described in the previous section and are very briefly summarized in the following. The studies show positive results for increasing engagement with feedback, though much of the data were from self-reported questionnaires and results mainly obtained from higher education contexts. Clearly, more research is needed, though Jonsson and Panadero (2018) suggest the SAGE taxonomy of proactive recipience could help facilitate and support future studies and attempts to improve engagement with feedback. When comparing Table 2.1, which relates characteristics of self-regulated learners and corresponding strategies for development, and the components of interventions for improving proactive recipience in Table 2.2, it is clear that there is considerable overlap. This suggests that there is likely a strong relationship between the development of

proactive recipients and self-regulated learning, and that engaging with feedback provides opportunities for this development.

Internalizing and applying standards. This cluster focused on having students become more familiar with assessment standards and applying them in activities such as peer- and self-assessment. Results of studies showed that self-assessment was thought to improve students' ability to question their work or understand criteria and tacit knowledge better (Jonsson & Panadero, 2018). Other findings showed that students appreciated interventions with assessment criteria as the focus and were particularly receptive to feedback received in one-on-one feedback dialogues (Jonsson & Panadero, 2018).

Sustainable monitoring. This cluster required students to document and track how performance and feedback changed over time. Students were also required to reflect on the development of their skills (Winstone et al., 2017). Highlights from these studies include the idea that engagement with feedback could be facilitated by requiring or encouraging learners to produce action plans, and that keeping portfolios of assessed work helped facilitate engagement in reflection (Jonsson & Panadero, 2018).

Collective provision of training. These interventions involved educators supporting groups of learners with information and resources intended to broaden learners' concepts of feedback processes, help them understand and use feedback effectively, and to be better prepared for their emotional responses to feedback (Winstone et al., 2017). Highlights from these studies include the finding that using a feedback guide could encourage students to engage more with feedback than they normally would and that students engaged with and appreciated assignment exemplars (Jonsson & Panadero, 2018).

Manner of feedback delivery. This cluster focused on altering how individual instances of feedback were delivered, including whether it was formative or summative, and aspects of its content, presentation, or style (Winstone et al., 2017). Highlights from the research showed that students who did not receive grades attended to feedback more, learners were more likely to use their feedback if they had requested it, and that students were receptive to feedback delivered digitally (Jonsson & Panadero, 2018).

Table 2.2

Intervention clusters and components identified by Winstone et al. (2017) (Jonsson & Panadero, 2018).

Cluster	Intervention Component
Internalizing and applying standards	Peer assessment
	Self-assessment
	Engaging with grading criteria
	Dialogue and discussion
Sustainable monitoring	Action planning
	Portfolio
Collective provision of training	Feedback workshop
	Feedback resources
	Exemplar assignments
Manner of feedback delivery	Formative assessment/resubmission
	Feedback without a grade
	Tailored feedback
	Presentation of feedback
	Technology

British Columbia's new curriculum has a shifting attitude toward assessment. There is now more emphasis and value put on classroom formative assessment and assessment literacy (British Columbia Ministry of Education, n.d.). Assessment literacy is one of the SAGE reciprocity processes described previously, relates to the interventions described in Table 2.2, and has value for improving proactive reciprocity. However, this new emphasis on formative feedback and assessment literacy also has positive implications for the development of self-regulated learning and metacognition. As Bandura (1994) highlights, clear, transparent feedback is one of the conditions that is necessary for the development of self-regulated learning. Table 2.2 offers many strategies and interventions that provide opportunities for increasing assessment literacy, and these are also opportunities for developing self-regulation and metacognition.

Peer assessment and self-assessment have gained significance in my classroom over the years. I am beginning to incorporate more think alouds and discussions related to these processes to scaffold thinking processes and selection of learning and regulatory strategies. I have found that when students are tasked with giving feedback and we discuss what good feedback looks like, students engage much more with criteria than if we were to simply review them as a class. An area I can improve in future practice is helping learners make the connection between their engagement with the criteria and selecting strategies for improvement of their own work. Peer assessment and open discussions about criteria can also result in students potentially benefiting from the collective efficacy of the classroom as they are exposed to other students' thinking and strategy selection. BC's Core Competencies offer many opportunities for recursive self-reflection throughout the span of their primary and secondary education using common language.

The relationship between formative and summative assessments has always interested me. I had initially learned that they were distinct, but I now view them as more fluid concepts. For example, a summative task can be used formatively when feedback is given and the student is given the opportunity to demonstrate improvement in learning. I have been doing this with math tests for the past few years. Any student is able to write an alternate version of a test to improve their demonstration of proficiency if they have evidence to show they have reviewed and practiced their approach to problems they were initially unsuccessful with. This promotes an increase in self-efficacy and allows students to follow through with a self-regulated learning cycle of forethought, performance, self-reflection, goal-setting, and action.

Figure 2.14 Reflections on assessment literacy and the new curriculum.

Discussion. Authentic engagement with and use of feedback require self-regulation and metacognition. Through engaging with the feedback process, students can develop skills to self-regulate their learning and decrease their reliance on others for appraisal (Butler & Winne, 1995). For example, engaging with feedback at the self-regulatory level might target a student's

process for revision or remind them to ask whether a response is reasonable (Lipnevich et al., 2016). This self-regulatory feedback can then be internalized and used by the learner in future situations that are similar.

A recurring theme with interventions for proactive reciprocity is the promotion of self-assessment and self-regulation (Jonsson & Panadero, 2018). These are the goals of sustainable feedback practice, coined by Dai Hounsell (2007), though explicitly defined by Carless, Salter, Yang, and Lam (2011) as, “dialogic processes and activities which can support and inform the student on the current task, whilst also developing the ability to self-regulate performance on future tasks” (p. 397). As a result of this distinction, Jonsson and Panadero (2018) suggest future research should distinguish between long- and short-term use of feedback. Carless et al. suggest that students may need to be involved in developing self-regulatory practices that align with sustainable feedback. Panadero, Jonsson, and Strijbos (2016) indicate that this includes interventions that support students’ understanding of the purposes of feedback, benefits of self-regulation, and practicing self-regulation strategies like peer feedback and self-assessment.

Exit Points

A theme throughout this literature review is that both feedback and self-regulated learning (which encompasses metacognition) are important, and that there is a bidirectional dynamic between them. Feedback is necessary for and scaffolds the development of self-regulated learning. Self-regulated learners have the capacity to select and use regulatory and learning strategies that support active engagement with feedback. In essence, they act in concert, creating a positive feedback loop, advancing the capability of the learner to the point where they have high self-efficacy and exhibit high levels of control with respect to their learning. As a result, this relationship can contribute to the development of successful, lifelong learners. It is

important to realize that the process described is part of a “long game” strategy, and is developed over the course of years, through both direct teaching and developmental milestones.

Emotional responses to feedback can influence how the feedback is processed cognitively, and as a result can affect the level of engagement with feedback. Because of this, it is important that strategies are developed to regulate emotion. However, emotions and their regulation are one entity within a larger system. Clear, transparent feedback can support the development of self-regulated learning, and increase self-efficacy and motivation, which can affect how emotions may be reappraised, interpreted, or moderated.

Another key reflection is the importance of knowing learners and developing relationships with them. Relationships are essential to effective teaching, and the development of self-regulated learning and receipt of feedback are additional aspects where relationships have strong influence over the potential for learning. Not only are relationships important for buy-in from learners to attend to modelling, think alouds, teaching, and feedback, but also so the teacher can craft feedback that is specific to a particular student; knowing the student well helps guide this process.

To conclude this project, consider the following hypothetical learning situation, which highlights the potential to integrate some of the ideas discussed in the literature review and preceding reflections. The integration of quiz reflections was inspired by the work of Blank et al. (2007).

It was March and Jaeden had just received her test back. The topic was demonstrating the relationship between fractions, decimals, and percents. There was no grade or percentage on the test, but it included a proficiency level with descriptors that were highlighted. There was also some descriptive feedback that noted how she applied previous feedback well and demonstrated

an improvement in understanding over the initial version of the quiz she had taken. The feedback included a QR code link to hear an audio version if she preferred to hear it. One of the comments noted that there were five errors in the test (that were not highlighted in any way) and she was to work with her table group to find them and correct them. It turned out the errors were all minor miscalculations. Jaeden initially felt upset that she had not done as well as she had wanted to, though was able to change her outlook and realize that during the next quiz she was going to review it before submitting it to attempt to catch any minor errors in calculations. She remembered the teacher had modelled a think aloud on how to look for and respond to errors. Jaeden then completed a guided reflection. There were questions about how well she did on the math test compared to the curricular competencies, what she had done to prepare for the practice test that she had written before the quiz, how her performance on the practice test compared to the actual test, and what she might do differently to prepare in the future.

Later on, she was being introduced to operations with integers. Class began with a very short ungraded pre-quiz that included questions intended to elicit recall from prior knowledge and asked students to rate their confidence level. The solutions were reviewed as a class and the students were asked to hold up their hands and give “fist to five” to rate their confidence level, five being the highest and able to teach the concepts to someone else. The teacher noted the high percentage of fives and began instruction of the new topic. Each student, including Jaeden, had a mini-whiteboard and a green, yellow, and red cup on their desk. As the teacher was modelling and thinking aloud for the class, students were to show green for high confidence in ability, yellow as a signal to slow down, or red as a signal that the student had questions. Jaeden had a number of questions, so was showing red. The teacher stopped and answered her questions, which allowed her to understand the concept completely, so she showed her green cup. The

teacher continued to model processes through think alouds, including how to check the work for accuracy and how to use estimation to make sure the answer made sense. Jaeden and the other students then worked through examples independently on their whiteboards, receiving immediate feedback from the teacher as they held them up. They also continued to see and hear how solutions were derived. The teacher noticed the attention of a couple of students was waning, so they stopped and had a class discussion about potential strategies to direct attention back to learning.

Jaeden's confidence in her ability in math had grown over the course of the year and she now felt that she was able to determine how well she did based on her actions. At the beginning of the year she viewed herself as "not a math person," and felt that it was a subject she just wasn't good at. However, the teacher had focused on giving feedback, modelling how to monitor thinking before and during a learning activity, self-reflection, and discussing learning strategies like seeking assistance from peers, self-reward, and setting goals, which all seemed to contribute to her becoming more successful and then building on that success. She noticed that her feelings about her ability improved over time and became more motivated as these feelings increased.

A number of classes later, leading up to the unit practice test, Jaeden reached out to her peers and the teacher for additional support. After marking the practice test in class, students were asked to reflect on their level of understanding and select from a list of strategies to further prepare for the quiz. Jaeden noticed that she was inconsistent when showing how to divide using the number line, so sought out some extra support and practice questions.

Leading up to the quiz, the teacher reviewed the proficiency levels and descriptors of each, explaining each of the levels. An exemplar was shown and matched to success criteria.

Students then worked in teams to mark a math test that had been completed by a student in a previous year.

During the quiz at the beginning of each section, organized by curricular competency, a rating scale asked students to predict their level of confidence with performance. Another rating scale was included at the end of each section asking students to rate their perceived confidence after the solutions had been determined. When Jaeden received her test back, it again had a proficiency level and descriptive feedback, letting her know what her next steps were. She was asked to complete a test reflection where she was encouraged to compare the ratings at the beginning and end of each section and see what she noticed, reflect on the strategies that were unsuccessful and what different strategies she would use, practice the strategy, and set a goal for future learning. Both the test and reflection were added to her portfolio for a future reflection that would reflect summatively on the term.

References

- Ainley, M., & Ainley, J. (2011). Student engagement with science in early adolescence: The contribution of enjoyment to students' continuing interest in learning about science. *Contemporary Educational Psychology, 36*, 4-12. doi:10.1016.j.cedpsych.2010.08.001
- Baadte, C., & Schnotz, W. (2014). Feedback effects on performance, motivation and mood: Are they moderated by the learner's self-concept? *Scandinavian Journal of Educational Research, 48*(5), 570-591. doi:10.1080/00313831.2013.781059
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. NJ: Prentice-Hall.

- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior*, Vol. 4, pp. 71-81. New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*. San Diego: Academic Press, 1998).
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. NY: Freeman.
- Bembenutty, H., White, M. C., & Vélez, M. (2015). Developing self-regulation of learning and teaching skills among teacher candidates. New York: Springer.
- Bing-You, R. G., Paterson, J., & Levine, M. A. (1997). Feedback falling on deaf ears: Residents' receptivity to feedback tempered by sender credibility. *Medical Teacher*, *19*, 40–44.
- Black, P. (2016). The role of assessment in pedagogy and why validity matters. In D. WyseL. Hayward & J. Pandya *The SAGE Handbook of curriculum, Pedagogy and Assessment* (pp. 725-738). London: SAGE Publications Ltd. doi: 10.4135/9781473921405.n45
- Black, P., & Jones, J. (2006). Formative assessment and the learning and teaching of MFL: Sharing the language learning road map with learners. *Language Learning Journal*, *34*, 4–9.
- Black, P., & McCormick, R. (2010). Reflections and new directions. *Assessment & Evaluation in Higher Education*, *34*(5), 493–499.
- Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, *80*(2), 139–148.
- Black, P., & Wiliam, D. (2006). Assessment for learning in the classroom. In J. Gardner (Ed.), *Assessment and learning* (pp. 9–25). London: Sage.
- Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, *21*(1), 5–31.

- Black, P., & Wiliam, D. (2018). Classroom assessment and pedagogy. *Assessment in Education: Principles, Policy & Practice*, 25(6) 551-575. doi:10.1080/0969594X.2018.1441807
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: a longitudinal study and an intervention. *Child Development*, 78(1), 246–263.
- Blair, A., Curtis, S., Goodwin, M., & Shields, S. (2013). What feedback do students want? *Politics*, 33, 66–79. doi:10.1111/j.1467-9256.2012.01446.x
- Blank, S., Hudesman, J., Morton, E., Armstrong, R., Moylan, A., White, N., & Zimmerman, B. J. (2007). A self-regulated learning assessment system for electromechanical engineering technology students. *Proceedings of the National STEM, Assessment Conference* (pp. 37-45). Washington DC: Drury University and the National Science Foundation.
- Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching*. San Francisco, CA: Jossey-Bass & Pfeiffer Imprints.
- Boekaerts, M., & Como, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology: An International Review*, 54(2), 199-231. doi:10.1111/j.1464-0597.2005.00205.x
- Bose, J., & Rengel, Z. (2009). A model formative assessment strategy to promote student-centered self-regulated learning in higher education. *US-China Education Review*, 6(12), 29–35.
- British Columbia Ministry of Education (n.d.) *Assessment literacy in B.C. video – transcript*. Retrieved from

<https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/assessment-literacy-video-transcript-en.pdf>

- Brophy, J. E. (2004). *Motivating students to learn* (2nd ed.). Lawrence Erlbaum: NY.
- Brown, J. (2007). Feedback: The student perspective. *Research in Post-Compulsory Education*, 12, 33–51.
- Butler, D. (2015). Metacognition and self-regulation in learning. In D. Scott & E. Hargreaves *The SAGE Handbook of learning* (pp. 291-309). 55 City Road, London: SAGE Publications Ltd doi:10.4135/9781473915213.n28
- Butler, D., & Winne, P. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 65, 245–281. doi:10.3102/00346543065003245
- Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different feedback conditions on motivational perceptions, interest, and performance. *Journal of Educational Psychology*, 79(4), 474–482. doi:10.1037/0022-0663.79.4.474
- Carless, D., Salter, D., Yang, M., & Lam, J. (2011). Developing sustainable feedback practices. *Studies in Higher Education*, 36(4), 395-407. doi:10.1080/03075071003642449
- Clarke, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review*, 24(2), 205-249. doi:10.1007/s10648-011-9191-6
- Cleary, T. J. , & Callan, G. L. (2018). Assessing self-regulated learning using microanalytic methods. In P. Alexander, D. Schunk, & J. Greene (Eds.) *Handbook of self-regulation of learning and performance* (pp.208-222) doi: 10.4324/9781315697048
- Cury, F., Elliot, A. J., Fonseca, D. D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, 90(4), 666-679. doi:10.1037/0022-3514.90.4.666

- Csikszentmihalyi, M. (2008) *Flow: The psychology of optimal experience*. New York, NY: HarperCollins.
- D'Mello S. K., Strain A. C., Olney A., Graesser A. (2013) Affect, Meta-affect, and Affect Regulation During Complex Learning. In Azevedo R., Aleven V. (Eds.) *International Handbook of Metacognition and Learning Technologies*. Springer, New York, NY
- Dumont, H., Istance, D. & Benavides, F. (Eds.) (2012). *The nature of learning: Using research to inspire practice: Practitioner guide from the innovative learning environments project*, OECD: Centre for Educational Research and Innovation. Retrieved from <http://www.oecd.org/education/cei/50300814.pdf>
- Ellis, H. C., & Ashbrook, P. W. (1988). Resource allocation model of the effect of depressed mood states on memory. In K. Fiedler & J. Forgas (Eds.), *Affect, cognition, and social behavior* (pp. 25-43). Toronto: Hogrefe International.
- Eva, K. W., Armson, H., Holmboe, E., Lockyer, J., Loney, E., Mann, K., & Sargeant, J. (2012). Factors influencing responsiveness to feedback: on the interplay between fear, confidence, and reasoning processes. *Advances in Health Sciences Education: Theory and Practice*, 17(1), 15–26. doi:10.1007/s10459-011-9290-7
- Fishbach, A., Eyal, T., & Finkelstein, S. R. (2010). How positive and negative feedback motivate goal pursuit: Feedback motivates goal pursuit. *Social and Personality Psychology Compass*, 4(8), 517-530. doi:10.1111/j.1751-9004.2010.00285.x
- Fontana, D., & Fernandes, M. (1994). Improvements in mathematics performance as a consequence of self-assessment in Portuguese primary school pupils. *British Journal of Educational Psychology*, 64(4), 407–417.

- Fox, E., & Riconscente, M. (2008). Metacognition and Self-Regulation in James, Piaget, and Vygotsky. *Educational Psychology Review*, 20(4), 373-389. Retrieved from <http://www.jstor.org.ezproxy.library.uvic.ca/stable/23363921>
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology. *American Psychologist*, 56(3), 218–226.
- Goetz, T., Lipnevich, A., Krannich, M., & Gogol, K. (2018). Performance Feedback and Emotions. In A. Lipnevich & J. Smith (Eds.), *The Cambridge Handbook of Instructional Feedback* (pp. 554-574). Cambridge: Cambridge University Press.
doi:10.1017/9781316832134.027
- Gross, J. (2008). Emotion regulation. In M. Lewis, J. Haviland-Jones, & L. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 497–512). Retrieved from <https://ebookcentral.proquest.com>
- Handley, K., Price, M., & Millar, J. (2011). Beyond “doing time”: Investigating the concept of student engagement with feedback. *Oxford Review of Education*, 37, 543–560.
- Harlen, W. (2006). The role of assessment in developing motivation for learning. In J. Gardner (Ed.), *Assessment and learning* (pp. 61–80). London: Sage.
- Hattie, J., & Timperley, H. (2007) The power of feedback. *Review of Educational Research* 77(1), 81-112.
- Hoskins, B., & Fredriksson, U. (2008). *Learning to Learn: What is it and can it be measured?* European Commission Joint Research Centre (JRC), Institute for the Protection and Security of the Citizen, Centre for Research on Lifelong Learning (CRELL). Luxembourg: Office for Official Publications of the European Communities.

- Hounsell, D. (2007). Towards more sustainable feedback to students. In D. Boud & N. Falchikov (Eds.), *Rethinking assessment in higher education. Learning for the longer term* (pp. 101–113). London, UK: Routledge.
- Jackson, C. (2015). Affective dimensions of learning. In D. Scott & E. Hargreaves *The SAGE Handbook of learning* (pp. 353-362). London: SAGE Publications Ltd doi: 10.4135/9781473915213.n33
- Johnson, G., & Connelly, S. (2014). Negative emotions in informal feedback: The benefits of disappointment and drawbacks of anger. *Human Relations*, 67(10), 1265-1290.
- Johnson, D. W., & Johnson, R. T. (1998). *Learning together and alone: Cooperative, competitive, and individualistic learning* (5th ed.). Boston: Allyn & Bacon.
- Jonsson, A. (2013). Facilitating productive use of feedback in higher education. *Active Learning in Higher Education*, 14(1), 63–76. doi:10.1177/1469787412467125
- Jonsson, A., & Panadero, E. (2018). Facilitating Students' Active Engagement with Feedback. In A. Lipnevich & J. Smith (Eds.), *The Cambridge Handbook of Instructional Feedback* (pp. 531-553). Cambridge: Cambridge University Press. doi:10.1017/9781316832134.026
- Kaplan, A. (2008). Clarifying metacognition, self-regulation, and self-regulated learning: What's the purpose? *Educational Psychology Review*, 20(4), 477–484.
- Kuiper, R. A., & Pesut, D. J. (2004). Promoting cognitive and meta-cognitive reflection reasoning skills in nursing practice: Self-regulated learning theory. *Journal of Advanced Nursing*, 45(4), 381–391.

- Lipnevich, A. A., Berg, D. A., & Smith, J. K. (2016). Toward a model of student response toward feedback. In G. T. Brown & L. R. Harris (Eds.) *Handbook of human and social conditions in assessment*. New York: Routledge.
- Lipnevich, A. A., & Smith, J. K. (2009). “I really need feedback to learn”: Students’ perspectives on the effectiveness of the differential feedback messages. *Educational Assessment, Evaluation and Accountability, 21*, 347–367.
- McAlpine, L., & Weston, C. (2002). Reflection: Improving teaching and students learning. In N. Hativa & P. Goodyear (Eds.), *Teacher thinking, beliefs and knowledge in higher education* (pp. 55–77). Dordrecht: Kluwer Academic Publishers.
- McCombs, B. L. (1989). Self-regulated learning and academic achievement: A phenomenological view. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 51–82). NY: Springer-Verlag.
- Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In G. H. Bower (Ed.), *The Psychology of Learning and Motivation, 26*, 125– 141.
[doi:10.1016/S0079-7421\(08\)60053-5](https://doi.org/10.1016/S0079-7421(08)60053-5)
- Nicol, D. J., & Macfarlane-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. doi:10.1080/03075070600572090
- Nisan, M. (1992). Beyond intrinsic motivation: Cultivating a sense of the desirable. In K. Oser, A. Dick, & J. L. Patty (Eds.), *Effective and responsible teaching: The new synthesis* (pp. 126-138). San Francisco: Jossey-Bass.

- OECD/CERI. (2008). Assessment for learning: Formative assessment. International Conference, Learning in the 21st Century: Research, Innovation and Policy. Paris: CERI/OECD.
Retrieved from <http://www.oecd.org/dataoecd/19/31/40600533.pdf>
- Olafson, K. M., & Ferraro, F. R. (2001). Effects of emotional state on lexical decision performance. *Brain and Cognition*, 45(1), 15-20. doi:10.1006/brcg.2000.1248
- Orsmond, P., & Merry, S. (2013). The importance of self-assessment in students' use of tutors' feedback: A qualitative study of high and non-high achieving biology undergraduates. *Assessment & Evaluation in Higher Education*, 38(6), 737-753.
doi:10.1080/02602938.2012.697868
- Orsmond, P., Merry, S., & Reiling, K. (2005). Biology students' utilization of tutors' formative feedback: A qualitative interview study. *Assessment & Evaluation in Higher Education*, 30(4), 369-386. doi:10.1080/02602930500099177
- 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* (pp. 311–326). Boston: Springer.
- Pape, S. J., Bell, C. V., & Yetkin-Özdemir, I. E. (2013). Sequencing components of mathematics lessons to maximize development of self-regulation: Theory, practice, and intervention. In H. Bembenuddy, T. J. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines: A tribute to B. J. Zimmerman* (pp. 29– 58). Charlotte, NC: Information Age.

- Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*, 315–341.
- Pekrun, R. (2017). Emotion and achievement during adolescence. *Child Development Perspectives*, *11*(3), 215-221. doi:10.1111/cdep.12237
- Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The achievement emotions questionnaire (AEQ). *Contemporary Educational Psychology*, *36*(1), 36-48.
doi:10.1016/j.cedpsych.2010.10.002
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeider (Eds.), *Handbook of Self-Regulation* (pp. 451–502). Orlando, FL: Academic Press.
- Pintrich, P. R., & Zusho, A. (2002). The development of academic self-regulation: The role of cognitive and motivational factors. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 250–284). San Diego: Academic Press.
- Pulfrey, C., Buchs, C., & Butera, F. (2011). Why grades engender performance-avoidance goals: The mediating role of autonomous motivation. *Journal of Educational Psychology*, *103*(3), 683–700. <https://doi-org.ezproxy.library.uvic.ca/10.1037/a0023911>
- Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, *18*(2), 119-144. doi:10.1007/BF00117714
- Sargeant, J., Mann, K., Sinclair, D., Van der Vleuten, C., & Metsemakers, J. (2008). Understanding the influence of emotions and reflection upon multi-source feedback

acceptance and use. *Advances in Health Sciences Education*, 13(3), 275-288.

doi:10.1007/s10459-006-9039-x

Schunk, D. H. (1998). Teaching elementary students to self-regulate practice of mathematical skill with modeling. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning: From teaching to self-reflective practice* (pp. 137–159). NY: Guilford Press.

Schwarz, N. (2012). Feelings-as-information theory. In P. A. Van Lange, A. W. Kruglanski & E. T. Higgins (Eds.), *Handbook of theories of social psychology: volume 1* (pp. 289-308).

London: SAGE Publications Ltd doi: 10.4135/9781446249215.n15

Shute, V. J. (2008). Focus on Formative Feedback. *Review of Educational Research*, 78(1), 153–189. doi:10.3102/0034654307313795

Stiggins, R. J. (2002). Assessment crisis: The absence of assessment FOR learning. *The Phi Delta Kappan*, 83(10), 758-765. doi:10.1177/003172170208301010

Stiggins, R. (2018). The Emotional Dynamics of Feedback from the Student's Point of View. In A. Lipnevich & J. Smith (Eds.), *The Cambridge Handbook of Instructional Feedback* (pp. 519-530). Cambridge: Cambridge University Press.

doi:10.1017/9781316832134.025

Topping, K. (2013). Peers as a source of formative and summative assessment. In J. H. McMillan *SAGE handbook of research on classroom assessment* (pp. 394-412).

Thousand Oaks, CA: SAGE Publications Ltd. doi:10.4135/9781452218649.n22

Turner, G., & Gibbs, G. (2010). Are assessment environments gendered? An analysis of the learning responses of male and female students to different assessment environments. *Assessment & Evaluation in Higher Education*, 35(6), 687-698.

doi:10.1080/02602930902977723

- Veenman, M. V. J., & Spaans, M. A. (2005). Relation between intellectual and metacognitive skills: Age and task differences. *Learning and Individual Differences, 15*(2), 159-176. doi:10.1016/j.lindif.2004.12.001
- Vogl, E. & Pekrun, R. (2016). Emotions that Matter to Achievement: Student Feelings About Assessment. In G. T. Brown & L. R. Harris (Eds.) *Handbook of human and social conditions in assessment*. New York: Routledge.
- White, M. C., & DiBenedetto, M.K (2017) Self-regulation: An integral part of standards-based education. In P. Alexander, D. Schunk, & J. Greene (Eds.) *Handbook of self-regulation of learning and performance* (pp.208-222) doi: 10.4324/9781315697048
- Wiliam, D. (2017). *Embedded formative assessment: (Strategies for classroom assessment that drives student engagement and learning)* (2nd ed.) [Kindle version]. Bloomington, Indiana: Solution Tree.
- Wiliam, D. [dylanwiliam] (2018, March 23) This is why I keep on pointing out that the main purpose of feedback is to improve the student and not the work... [Twitter] Retrieved from <https://twitter.com/dylanwiliam/status/977265017279033344>
- Winne, P. H. (2017) Cognition and Metacognition within Self-Regulated Learning in *Handbook of Self-Regulation of Learning and Performance*. In P. Alexander, D. Schunk, & J. Greene (Eds.) *Handbook of self-regulation of learning and performance* (pp. 36-48) doi: 10.4324/9781315697048
- Winstone, N. E., Nash, R. A., Parker, M., & Rowntree, J. (2017). Supporting learners' agentic engagement with feedback: A systematic review and a taxonomy of recipience processes. *Educational Psychologist, 52*(1), 17-37. doi:10.1080/00461520.2016.1207538

- Yang, M., & Carless, D. (2013). The feedback triangle and the enhancement of dialogic feedback processes. *Teaching in Higher Education, 18*, 285–297.
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*(3), 329–339. [doi:10.1037/0022-0663.81.3.329](https://doi.org/10.1037/0022-0663.81.3.329)
- Zimmerman, B. J. (2000a). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation research, and applications* (pp. 13– 39). Orlando, FL: Academic Press.
- Zimmerman, B. J. (2000b). Self-efficacy: An essential motivation to learn. *Contemporary Educational Psychology, 25*(1), 82-91.
- Zimmerman, B. J. (2002) Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2) 64-70.