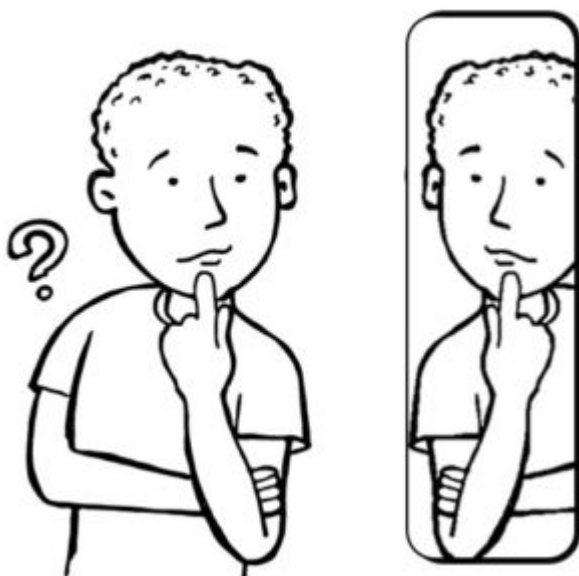


Reflecting with Purpose

REFLECTING WITH PURPOSE



*A Research-Backed, Educator's Guide to
Fostering Student Reflections*

Benjamin Storie



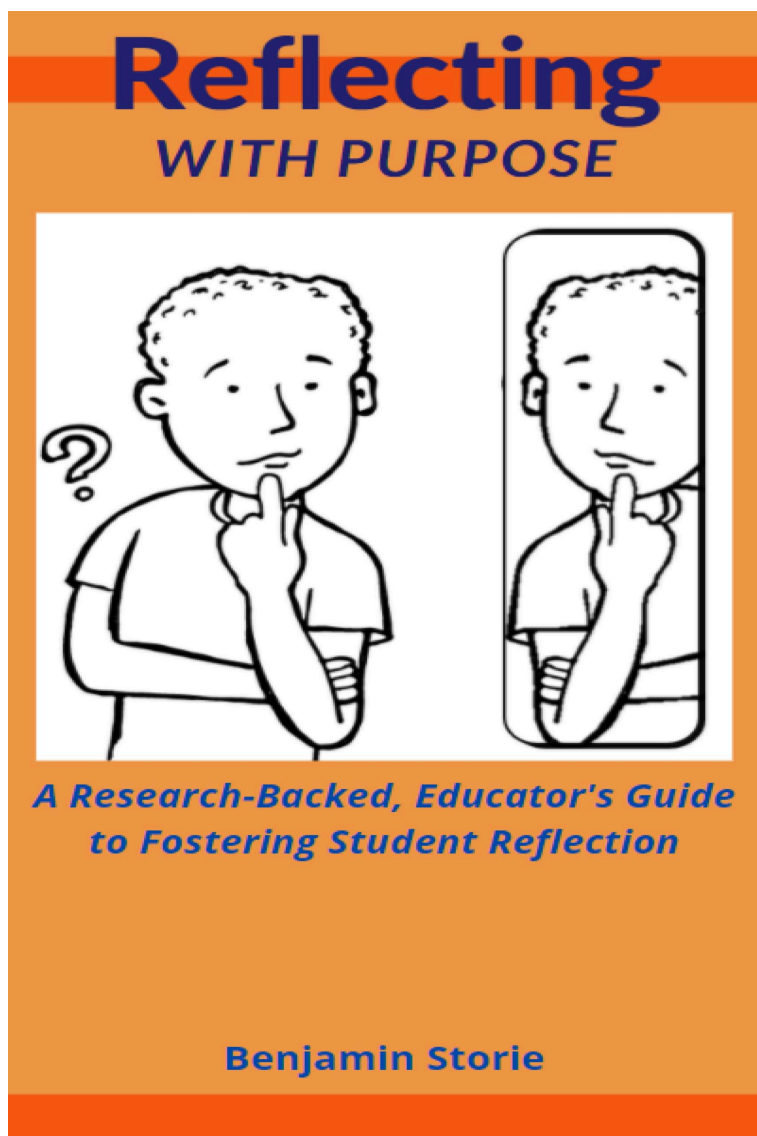
Reflecting with Purpose by Benjamin Storie is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/), except where otherwise noted.

Contents

<u>Book Cover</u>	vii
<u>Acknowledgements</u>	viii
<u>Preface</u>	ix
<u>The Intersection of My Experience</u>	xii
<u>Useful Definitions</u>	xvi
 <u>Part I. THEORY</u>	
1. <u>Constructivism and the Rise of Digital Learning</u>	3
2. <u>What is SRL and Where Do We Start?</u>	6
3. <u>Metacognition and Reflection: Is there a Difference?</u>	10
4. <u>The Research on Reflection</u>	14
 <u>Part II. PRACTICE</u>	
5. <u>How Do You Get Students Reflecting?</u>	21
6. <u>Reflective Activities</u>	29
7. <u>Reflective Activities - Summary</u>	37
8. <u>Choice in Today's Classroom</u>	38
9. <u>The Hidden Key to Reflective Practice</u>	46

10. A Final Reflection on Reflection	52
11. Conclusion	56
Reference List	59
About the Author	66
Back Cover	67

Book Cover



Acknowledgements

Not only did the bulk of the work of this project occur during COVID-19 pandemic restrictions, but also during the protests and marches that took place all over the world to demand necessary action against racial inequality, police brutality, and social injustice. These profound events are at the forefront of my mind as I sit here and work at this project, and these events demand that I begin my acknowledgements by recognizing that I sit on Treaty One territory—traditional ground of the Anishinaabe, Cree, Oji-Cree, Dakota and Dene people, and on the homeland of the Métis Nation. I am privileged to have had the experiences and upbringing that I have had, I recognize that this privilege has led to opportunities that others cannot equitably access, and I acknowledge that we must all do work to not only repair and strengthen our partnership with Indigenous communities to fulfill the collaborative spirit necessary for reconciliation, but also work to address all marginalized peoples and points of social injustice everywhere.

Preface

While my personal learning journey has led me to question, adopt, refine, or reject various pedagogical ideas, I had never thought to evaluate or describe my “process” for becoming a better educator. But in the search for material for this book, I came across *Reflection: Turning Experiences into Learning*.¹ In the second chapter, written by J. P. Powell, I found the perfect written expression of my experience as an educator:

*“My own practice, like that of the great majority of teachers, was not derived from any carefully devised theoretical position, but was based upon beliefs and insights which had emerged in a very ad hoc and leisurely manner over a number of years of experience of trying to assist others to learn.”**

So where does an educator looking to improve their practice turn for guidance and professional development outside of self-reflection and trial and error? Keynote speakers and edu-books, that’s where!

In my experience attending professional development sessions, it is common to find little to no research mentioned in support of the main topic. Often the speaker will develop the topic with humorous anecdotes and exemplars of their interventions, perhaps provide some statistical data of the success or failures of some pedagogical approach, and may

even offer up a name or two of a leading figure in that area; but, rarely is the audience provided with details of academic research evidence and/or time to digest these research findings. This lack of research support appears as a commonality through my experience in reading popular edu-books. The pattern of topic development mirrors a standard professional development session, and again, it is rare to find much in way of supporting research. These books often neglect to include academic research footnotes and an end-of-book reference list.

Which brings me to this book—it is difficult enough to find time outside of the basic demands of educating students to read educational literature, let alone dig into academic research (I acknowledge that not everyone is clamoring to read research). But I argue that if educators can be made aware of the supporting research connecting new pedagogical approaches, it will make them more likely to invest some of their precious class time to incorporating new or unfamiliar strategies.

The trends of technology use and personalized learning options in today's classroom has increased the need for student agency. This makes the investigation into, and inclusion of, the skills a student requires to take more control the keystone of our current situation. This book contains my investigation into skills learners need to navigate our current and future educational landscape—specifically the skill of reflection. The aim of this book is to provide educators with a research-based guide outlining ways to improve learning outcomes by scaffolding and honing student reflective practice.

The book is split into two sections—Theory and Practice. The Theory section provides detail into the background,

theoretical frameworks, terminology disputes, and research in support of reflection in the classroom. To maintain the flow of the writing, the research links are noted in-text, and listed at the back of the book in the Reference section. Relevant research was pared down based on two criteria: the importance of the work and recency of the study. Where possible, the references are hyperlinked to an open-access channel—to encourage exploration beyond these pages. If you would prefer to skip the research and move right into the “how to” of the Practice section—fine. The Practice section contains research-backed activities and insights to get started with reflective practice immediately. For accessibility, the graphics have been reproduced on an associated [WordPress](#) site in alternate format to make available to assistive technologies.

Dig in and enjoy!

*Boud et al. (1985), p.44

The Intersection of My Experience

What I've Noticed About Myself

I was fortunate to have two wonderful parents with slightly different world views: one taught me to consider practicality and prudence—a “plan for the worst but hope for the best” message, while the other stressed the importance of not hesitating out of fear of failure—a “the best laid plans...” mentality. Together they instilled a habit of thoughtful planning with the acceptance that obstacles and errors were inevitable and crucial for growth. That habit has guided me in all aspects of my life inside and outside the classroom: plan, reflect, and adjust.

I am endlessly consciously and subconsciously reflecting. While I now have a more sophisticated understanding of this skill I developed over time—thanks to the *reflection-in-action* and *reflection-on-action* work of Donald Schön²—I have always understood that reflective practice was foundational to the improvements I'd made in all aspects of my personal and professional life.

What I've Noticed About Students

I had often wondered why so many of my students had difficulty progressing in their learning and identifying issues with necessary skill development, or struggled to show even marginal growth after repeated assessment opportunities. Having only a cursory understanding of the academic term “metacognition” or how to teach it, I attempted to force my students to be more reflective—with poor results. My early attempts were based on trite question prompts like “Why were you unsuccessful?” or “How will you improve on this?” These prompts elicited short, equally trite responses like “Study harder,” or “Read over the notes more.” These typically weak reflective responses are an indication that students may not have the training to reflect with depth, which researchers³ explain is a result of educators like myself, often lacking the knowledge to properly introduce metacognitive training into class. In addition, the shallow responses are typical of students who are likely to be skeptical of the importance of reflection,⁴ leading to lackluster responses that are likely crafted to meet the expectation of the teacher.^{5,6}

What I've Noticed About Teaching

Even within my relatively short 12-year career, my teaching strategies and resources have changed with alarming frequency. What began as lecture-style teaching with a standard white board and paper handouts, quickly moved through a digital projector and a reservable bank of laptops, an interactive white board with cloud computing, and finally a division-wide “bring your own device” policy launched along with an unspoken expectation to move towards a paperless teaching environment. However, it is notable that these changes occurred with little to no training or professional development on the technology, or in the pedagogical shifts necessary to make full use of the technology. Where I began with more traditionalist teaching, I found myself stumbling through personalized, project-based, or collaborative learning.

What I've Noticed About Technology

The acknowledgement of technological skill development as a means of preparing students for future learning needs is recognized in the *Future of Education and Skills 2030* project⁷ of the Organisation for Economic Co-operation and Development (OECD). This project outlines the need to prepare students to use the technologies that are present and emerging and mentions the importance of personalized learning environments for future skills training. For some students, these new technology-based learning environments, which allow them to take a more active role in learning, requires a novel degree of self-regulation then necessary in traditional lecture-style learning.⁸ Although I was aware that skills like goal setting, planning, and self-control were crucial to independent learning, I was often so busy with the business of incorporating technology that I did nothing to promote them.

Taken together, I recognize the role that reflection has played in my improvements, personally and professionally, and I have noticed that students struggle to reflect on their learning. Both technological advances and simple necessity are changing the method of educational instruction to more personalized, computer-based learning opportunities, and these environments require a student have additional skills to navigate the technology and take an active role in learning. It has been my general experience that students lack self-regulation skills, that reflection is an important component of this process, and that these skills are essential to actively learn in these environments.

Useful Definitions

Digital Learning

There are a range of terms—distance education, blended learning, online learning, e-learning, 21st Century learning, and web-based learning—acknowledging the ubiquitous drive to incorporate Web 2.0 technology with new pedagogical opportunities. To simplify the writing, the research-suggested and broad term, *digital learning*⁹ will be used when discussing any technology-infused learning.

Self-Regulated Learning (SRL)

SRL is a learning framework that outlines the cognitive and metacognitive processes that influence active participation in learning. First studied and modeled by educational researcher, Barry Zimmerman, it is a complex topic, connected with other variables such as motivation and emotions. It is the ability to control and regulate thoughts and actions to reach a goal.

Metacognition

A key component of SRL, the term metacognition—introduced by psychologist John H. Flavell—involves a self-awareness of the knowledge, experiences, and strategies of cognitive thought, and the regulation of cognitive action or cognitive processes both during and after an event.¹⁰ Simply put, it is mentally tracking what you are doing, why you are doing it, and how well it seems to be working.

Reflection

A common term often used interchangeably with metacognition; reflection is the act of looking inward in order to review experiences. The OECD identifies reflection as a strategy for engaging metacognition.¹¹ It is a foundational skill for improving SRL.

PART I

THEORY

I. Constructivism and the Rise of Digital Learning

*“Gone are the days when the lecture was the dominant mode of course delivery and deemed the essence of a successful course experience.”**

Constructivism and Digital Learning

Any instructional design changes that have taken place in classrooms since the beginning of the 21st century have largely been informed by constructivist learning theory. Originating with the influential work of philosopher John Dewey,¹² constructivist learning environments like those found in project-based learning, inquiry learning, or discovery learning, focus students to actively build understanding by merging individual perspectives and knowledge with new learning derived from relevant activities and experiences.¹³ Occurring alongside these instructional changes has been the rise in technology use to enhance or augment learning, which often requires students to take responsibility for controlling aspects of the content and resources for learning.^{9,14} Research has not only suggested that aspects of constructivist learning are often present in

digital learning, but that digital learning may be necessary to make the most of constructivist learning situations. Digital learning environments can involve components such as actively and adaptively managing content and constructing personal meaning within a social context.^{15,16} However, research shows that digital learning environments are often underutilized by students because, in addition to needing basic technological proficiencies, they lack the appropriate cognitive and metacognitive strategies to take an active role in learning.^{17,18}

Navigating Through It All

Identified as **self-regulated learning (SRL)**, these skills can specifically include processes like identifying the task, setting goals, planning, self-control, evaluation, and self-reflection.¹⁹ SRL research is many decades old, with SRL and its components having been shown to have value with or without a constructivist lens^{8,20} and recognized as important for life-long learning both in research^{19,21} and in national and international initiatives.^{7,8} While the nature and complexity of SRL and the learning process make it difficult to identify specific components on which to focus to improve student outcomes,^{22,23} large meta-analyses²⁴ of research into SRL scaffolding in digital learning conclude that students must apply SRL skills to effectively navigate and learn in digital learning settings, and that providing SRL support in digital learning environments positively affects student learning.²⁵

BOTTOM LINE

Constructivist learning is increasingly common and digital learning is the new reality—research says that students need strong SRL skills to thrive in these settings.

*Bonk (2009), p. 32

2. What is SRL and Where Do We Start?

*“Self-regulation is important because a major function of education is the development of life-long learning skills.”**

Popular SRL Models

Among the several available SRL models in research, there is agreement that the SRL process is a recursive cycle comprised of generally identifiable phases: preparation, performance, and appraisal. While models vary in detail and process breakdown, these phases typically involve some variation of setting goals, selecting and planning strategy use, continually monitoring progress against a target or ideal, and reflecting on the outcome or success of the process with designs on improving in the future. Here is a wonderfully clear and simple graphic showing this general SRL model (used with permission from [Kristin O'Connell](#)).

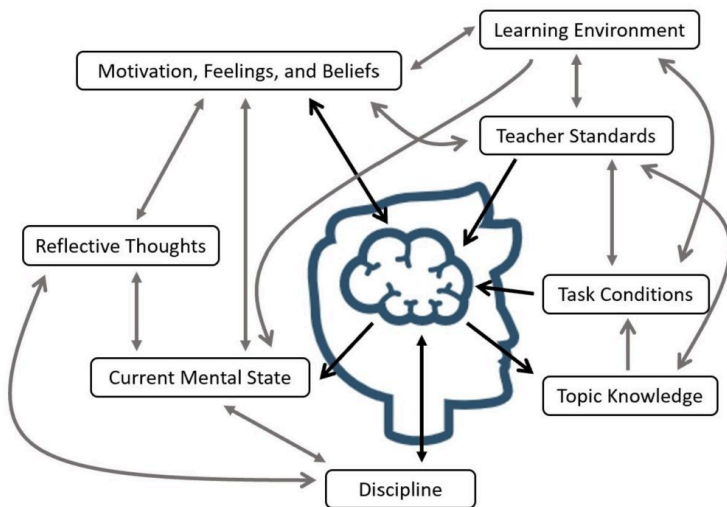


Image by Kristin O'Connell

The most academically cited SRL models in my research are known as the Zimmerman model and the Winne and Hadwin model. First unveiled in 1989, the Zimmerman model—which is functionally similar to this graphic—is a cyclical model identifying three SRL phases: *forethought*, *performance* and *self-reflection* (while Kristin did not label these three colour-coded regions, she mentioned it was designed from the Zimmerman model). While the current iteration of the Zimmerman model²³ contains a little more detail than this graphic, research indicates that it remains popular specifically because it is easier for educators to explore and apply than more elaborate SRL models.²⁶

For comparison against the simple SRL model, we have the elaborate Winne and Hadwin model, presented in 1998.²⁷ Despite being less intuitive, the Winne and Hadwin model is

favoured for use in research with digital learning.,²⁶ It breaks SRL into a *four*-phase, recursive feedback loop of processes similar to those discussed, however with more explicit emphasis on active **metacognition** during each phase. Here, is my interpretation of the Winne and Hadwin model (and even still I may have simplified it).



Where Do We Start?

Regardless of model, research has shown that SRL not only operates through cognitive and metacognitive processes but is also influenced by the learning environment, and student motivation, behaviour, and sense of self. This makes it difficult to research in its entirety, and even harder to isolate and study a single specific variable within such a tangled learning process.²⁶ Of the processes and variables embedded within SRL, it is metacognition that is considered the hub,²⁸

with one meta-review of the literature concluding it is the most important predictor of learning performance.²⁹ Attributed to the research of John Flavell, metacognition once stood as a separate learning perspective distinct from SRL; however, continued research has noted the entanglement of these two concepts,²¹ showing that metacognition is present throughout the SRL process of students engaged in digital learning.¹⁷ Unfortunately, multiple research studies have also reported difficulty in evaluating metacognitive strategies as an absolute, agreed upon definition of metacognition remains elusive.^{3,30}

BOTTOM LINE

SRL models attempt to outline the complex cognitive, metacognitive, and behavioural processes of learning—research says that metacognition is the keystone.

*Zimmerman (2002), p. 66

3. Metacognition and Reflection: Is there a Difference?

*“I am absolutely convinced that there is, overall, far too little rather than enough or too much cognitive monitoring in this world.”**

Metacognition Vs. Monitoring

As mentioned in the Useful Definitions section, metacognition is an awareness of your thoughts, feelings, actions, and outcomes. Flavell, in his landmark paper on metacognition, explains “cognitive strategies are invoked to make cognitive progress, metacognitive strategies to monitor it.”† He goes on to distinguish between metacognitive knowledge (thoughts on prior knowledge and strategies), and metacognitive experiences (thoughts on feelings and events); but it is here, in this first occurrence of tying metacognition to the term monitoring, that we fall down the terminology rabbit hole.

Researchers have made note of the many overlapping terms for concepts that may be metacognitive. Looking back

to our two SRL models, Zimmerman has, across years of SRL research, used the terms *self-reflection*, *self-monitoring*, *metacognitive monitoring*, and *metacognitive reflection* in describing an SRL skill of successful learners.^{19,20,22} Winne and Hadwin opt for the term *monitoring*²⁷ in their SRL model—despite the model being known as strongly metacognitive in nature. Regardless of which term to place bets on, studies involving digital learning show that continuous monitoring is essential through all phases of SRL.^{17,25}

What about Reflection?

The process of monitoring one's thinking has its origins with John Dewey,¹² frequently noted as the originator of educational thought on reflection. In writing on the importance of reflection, Dewey states that “all reflection involves, at some point, stopping external observations and reactions so that an idea may mature.”‡ Further hallmark work by philosopher Donald Schön, who in evaluating how both professionals and “ordinary people” adapt and improve, distinguished between monitoring thought within a moment and after the fact, labeling the two situations *reflection-in-action* and *reflection-on-action*. Schön moves on to illustrate that reflective practice is the foundational strategy for all skill improvement.²

The term **reflection** is also defined in different ways in the research. While one researcher,³¹ investigating reflective practice in high school, discusses stimulating metacognition with reflective activities, a second researcher,⁵ studying

reflection in university around the same time period, discusses stimulating reflection with metacognitive activities. While these researchers seem to put the opposite ideas as subordinate to the main, there is agreement that metacognition and reflection are interwoven. The OECD, in documents from its *Future of Education and Skills 2030* project,¹¹ firmly superordinate metacognition by identifying reflection as a method of practice for developing metacognition—a position supported by other researchers^{14,32}—stating that “reflection is the thread that makes continuity of learning possible.”§

It would seem that research on monitoring, metacognition, and reflection are all discussing the same basic learning strategy and in fact I have yet to read anything explaining another monitoring or metacognitive “strategy” that wasn’t really just reflecting. In addition, there is loads of research that discusses that most educators lack training and understanding of metacognition and are apprehensive to promote it as a learning strategy.³ So, *that’s it*. I may make academia mad, but I’m calling this one—let us just use the term reflection. Most people (students included) already have a common understanding for this term as opposed to ideas like SRL and metacognition, which means if we want to give educators and students the language and skills to make this part of their learning strategy toolkit, it’s probably best to simplify the language.

BOTTOM LINE

The terms *monitoring*, and *metacognition* are essentially the same as reflection—research says reflection is a foundational skill vital to the entire SRL process.

*Flavell (1979), p. 910

†Flavell (1979), p. 909

‡Dewey (1909), p. 210

§OCED (2019), p. 6

4. The Research on Reflection

*“By its very nature the act of reflection can only reveal what we are.”**

Meet them where they’re at!

While research suggests that a child’s metacognitive ability emerges in early adolescence and continues to expand, a longitudinal study on metacognitive skill and intellectual ability, noted that 15 years old seems to be a significant point of age for developing these skills.²⁹ In writings, Winne, of SRL model fame, refers to students as “learning scientists” and discusses the importance of providing students with opportunity to practice and develop metacognitive skills like reflection,²² as these skills may not necessarily develop without support.³ In addition to needing support to develop the strong reflective skill required for learning, students come with a lot of baggage. Ineffective learners are poor judges of themselves, often overconfident in their abilities, they do not seek help, and frequently deflect mistakes to avoid damaging self-image.²² Effective learners monitor and improve learning strategies as they develop—this requires

reflection. Additionally, students often believe that knowledge is binary—you either know it or you don't. Many fail to recognize that knowledge has multiple levels, sometimes referred to as declarative, procedural, and contextual knowledge. You may be able to recall information, but not know when it would be useful, or how to use it effectively. Winne suggests students need help with three areas: collecting data on how they work through learning and its success rate, creating a bank of metacognitive learning tactics and strategies, and opportunity to practice metacognition until it becomes an automatic process. All of this can be accomplished through reflection!^{22,33}

But does it work?

That depends. Research showing a positive connection between SRL skill and learning outcomes was already well-established 20 years ago, and more recent meta-analyses investigating SRL supports with digital learning have noted that SRL skill improves academic performance.^{16,34} Due in part to the terminology mudpuddle discussed earlier, it is more difficult to find studies specifically investigating reflection and academic outcomes; however, many recent studies investigating metacognition in digital learning for both post-secondary and high school students have shown that more frequent monitoring leads to better academic performance.¹⁷ Results from studies that use the term reflection in investigating learning outcomes have not been a slam dunk. The current batch of research has only found limited positive effect on student performance and learning,⁴

although it is also noted often that reflection is generally well-received by students both as a cathartic activity and in their perception that it aids learning.^{6,35,36} These slightly underwhelming results do not mean that reflection is not worth time as a skill for learning (the research on metacognition is robust), but only point to the difficulty in studying student reflection in an academic research setting. In fact, the authors are careful to outline four general limitations in the research.⁵

First, most research only involves the commonplace understanding of reflection as a post-activity support³⁷—this clearly limits the potential of the skill of reflecting to a small part of the learning process, which obviously reduces the impact that could be seen in learning outcomes.¹⁸ Second, reflection is entangled in the larger SRL process, which itself is connected to learner motivation, interest, behaviour, and beliefs. It is incredibly difficult to parse out a single variable for study and assume it can be researched in isolation for its impact. The third common concern is the short duration of most research studies. It is common to mention that a lack of strong positive results may be due to providing insufficient time or instruction that would help students to better understand, use, and appreciate reflective practice in order to see benefits.^{4,32,38} And finally, there is the recognition that metacognitive skills are often overlooked in the content area of most courses³³—due to lack of time generally and an already jam-packed curriculum.^{5,39} I risk stating the obvious when I summarize that complex things rarely work well when done poorly, quickly, with no training, and with little practice.

Why reflection often fails?

Part of the failure to see strong results stems from the internal and individual nature of reflection itself. This was noted decades ago: “only learners themselves can learn and only they can reflect on their own experiences...at this basic level the learner is in total control.”† Encouraging stuff! As mentioned earlier, most students are unaware of their internal thought processes—they are unlikely to have the language of metacognition or SRL—which makes reflecting difficult and success unpredictable (and that’s if they are motivated and interested to try). For most students, reflection occurs most commonly within normal life situations in sports, friendships, hobbies—post-activity, self-directed, outside of school, and away from teachers. Students may not see reflection as necessary or meaningful in a school setting where control of their learning rests firmly in the tight-fisted hand of their nearest teacher. It may also be too much mental gymnastics for students new to reflective practice to simultaneously work on a thing (cognitive load) and monitor their work on that thing (metacognitive load).¹ But it isn’t all the fault of the student (darn it!). Research shows that educators may not have a detailed understanding of reflection, or the skills associated to teach and assess student reflections effectively,³⁹ and often assume some level of reflective thought is present in students because it is such a familiar (to adults) process. Without the clarity of strong instruction, reflective practices are likely to be ineffectual and superficial.^{31,32} So, I guess we have some work to do too.

BOTTOM LINE

Students are pretty bad at reflecting on their learning and need lots of guidance and instruction—research says...not much on “reflection,” but lots on the positive effects of metacognition to enhance learning. Ughhhhh!

*Boud et al. (1985), p. 50

†Boud et al. (1985), p. 11

PART II

PRACTICE

5. How Do You Get Students Reflecting?

*“Reflection can be done well or poorly, successfully or unsuccessfully, but it is always a productive experience.”**

Expanding Our Idea of Reflecting

Sorry if you have skipped the Theory section to this point; but, before we look at what components are needed for students to reflect well, we must start by broadening our definition for *reflection*. Research into reflection or reflective practice often includes an acknowledgment that the common understanding of “reflecting” involves only retrospective thought.^{37,41} Even the popular Zimmerman SRL model, which alludes to monitoring throughout, specifically identifies self-reflection as the final phase (albeit of a cyclical process). Yet if reflection is used to continuously monitor processes within SRL, then the common understanding must be expanded. Thankfully, a systematic literature review—focusing on support of SRL in digital learning—identified and labeled three types of reflection used in research: *reflection before action*, *reflection during action*, *reflection about action*.¹⁸ Acknowledging the work of Schön,

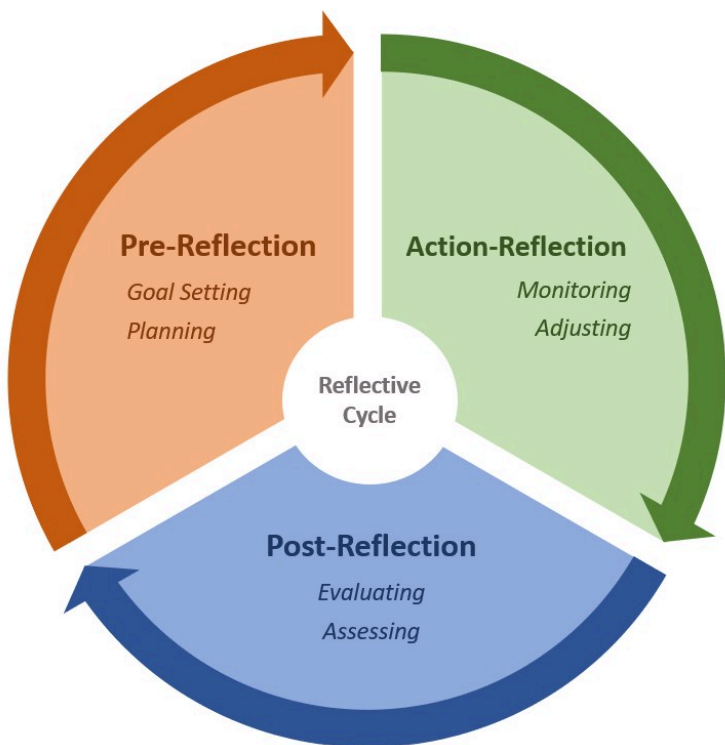
some researchers have even chosen to add directly to *reflection-in-action* and *reflection-on-action*, completing the continuum by identifying preparatory reflection as *reflection-for-action*.⁴¹

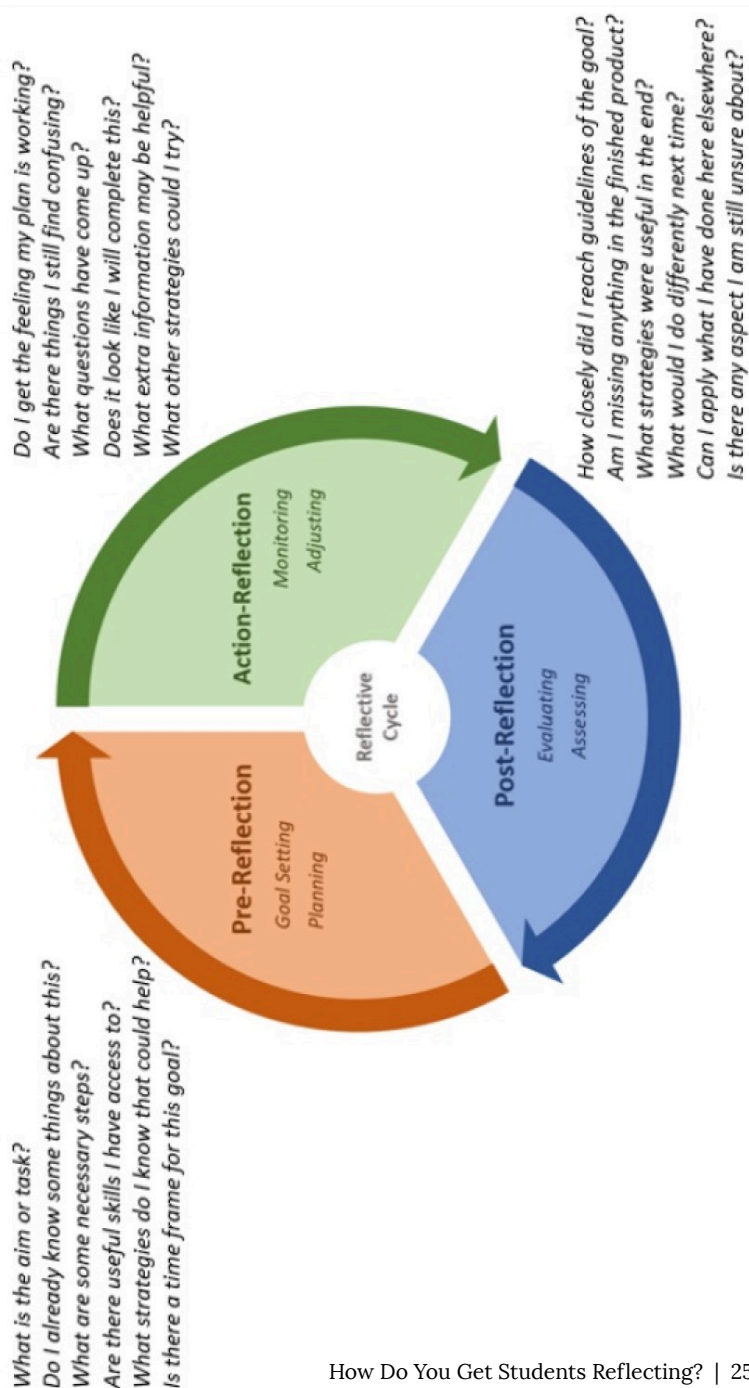
The Importance of Prompts

Nearly all studies on engaging reflection (to improve SRL, or otherwise) use some sort of prompt to direct participants. Students need support to be introspective and collect accurate data on themselves and their process. Poor learners tend to be reactive in their learning approach, applying strategies without forethought and rarely altering failing strategies in the moment. Prompt can be broadly defined as being questions, question stems, instructions, picture, or graphics used to provoke a response.⁴⁰ In research however, most prompts used to support reflection are extensions of prompts suggested by Schön, who described reflective questions during his dissection of *reflection-in action*, by asking “What features do I notice when I recognize this thing?” and “What procedures am I enacting when I perform this skill?” Prompts should be used in digital learning for every step of the SRL process, such as: identifying the goal (What do I want to learn?), into planning and processing (How do I proceed?), and finally evaluation of the learning outcome (Did I reach the learning goal?).⁴² Helping students to use this approach to reflect continuously through the entire learning process is a strong instructional design strategy for educators using digital learning.^{18,24,43}

The Reflective Cycle

Following our discussion on SRL models and the central role of reflection, the muddled terminology surrounding these ideas, and the recognition of the importance of continued reflection throughout the learning process, I decided to try my hand at creating my own graphic for this work. The graphic below was inspired by several authors, both in the interpretations of the SRL process,^{5,23} and in the use of prompts for continuous reflective practice.^{1,30} I attempted to use clear, familiar language that students will easily connect with, allowing for quick internalization. The labels for each phase of the cycle are modified from Schön and reference reflecting on the task at hand: *Pre-Reflection* is reflection done *before* the task is started and involves identifying the goal and creating a plan; *Action-Reflection* is initiated *during* the task to monitor and adjust the progress and strategies; *Post-Reflection* is reflection at the *conclusion* of the task to evaluate and assess success. Each phase includes SRL-process indicators to help the student construct an overview of the learning component, and each phase is accompanied by six plain-language guiding prompts.





While it is possible to just take this graphic, show it to students, and start reflecting, I would caution you against thinking it will just be *that* easy. There is more to consider than just having a list of prompts and a sexy graphic! Building a robust and sustainable reflective practice in your classroom requires a consideration of how, when, and why these prompts are rolled out, as well as pre-emptively creating the scaffolding needed for students to find quality learning in the process. Students are often less than great at reflecting within the classroom and will need lots of support to improve this skill. But if you absolutely cannot contain your excitement and must start immediately, you could begin the conversation with these tips and work through the book as you go.

*Trumpower & Sarwar (2015), p. 188

Tips to Starting the Conversation

- Start today, this class!
- Build a group definition based on students' current understanding of the word "reflection."
- Brainstorm aspects of their lives where they currently reflect.
- Expand the definition of reflection and introduce The Reflective Cycle.
- Be open about your reflection experience personally, socially, and professionally.
- Discuss the differences between reflective work and descriptive work.
- Pick a prompt or an entry-level activity from the next chapter that can be scaled for any level of learner.

BOTTOM LINE

Reflection is more than just retrospective; it is an on-going and necessary part of the whole learning cycle—research says that prompts are a specific strategy to spark the reflective process in students.

6. Reflective Activities

*“Reflection involves not simply a sequence of ideas, but a consequence.”**

Now that we have some direction for implementing and improving reflective practice—a series of prompts for all occasions (not exhaustive of course, feel free to reinvent and add your own touch)—let us examine some ways in which to use prompts and other reflective activities. There are many educational books already covering the subject of reflective practice; however, in my searches, the results appear to be written with mostly the educator in mind as the reflective practitioner, not the student. Also, these texts (like a lot of the research) appear to do so without consideration for technology, as most suggest the popular, but technologically limited reflective practice of pen-and-paper “journaling.” However, the use of technology and various media for reflection will be the subject of the next chapter; for now, let us investigate some suggestions for getting students reflecting.

Many of the following ideas for incorporating reflection come from two sources that I found had the most bang for my buck—although I have jazzed them up a bit.^{44,45} And while some of them may be recognized as simple, tried-and-true

pedagogical techniques, others may represent an angle of reflection not considered in your practice to this point.

~5min Reflections

On the Side

The simplest way to start students' reflecting without overwhelming them or turning off motivation is to get them working in the margins of their work. While some students may have already developed this method through personal strategy development, it can be scaled-up to include codes that identify specific reflection without asking for a lot of writing. Here are some suggestions for you to build from:

ON THE SIDE



This was difficult, but I can do it.



I understand this and can do it.



I still have a question on this.



I had help to do this.



I need more time on this.

Example of a student with unprompted margin reflections

$$\begin{array}{l}
 7 \cdot \frac{5}{14} + \frac{2}{7} = \frac{20}{28} + \frac{28}{28} = \frac{48}{28} = \frac{24}{14} = \frac{12}{7} \\
 2 \cdot \frac{6}{13} - \frac{8}{26} = \frac{12}{26} - \frac{8}{26} = \frac{4}{26} = \frac{2}{13} \\
 2 \cdot \frac{5}{7} + \frac{1}{14} = \frac{10}{14} + \frac{1}{14} = \frac{11}{14} \\
 * \frac{2}{3} + \frac{23}{7} = \frac{49}{21} + \frac{69}{21} = \frac{118}{21} = \\
 \frac{2}{3} - \frac{1}{2} = \frac{4}{6} - \frac{3}{6} = \frac{1}{6}
 \end{array}$$

Quick Think

These are short (a couple sentences) reflective opportunities using a prompt, which could be easily added as a Pre-Reflection component to an entry slip, Post-Reflection to an exit slip, or mid-activity as Action-Reflection.

Reflective Cycle Prompts

PRE-REFLECTION



- What is the aim or task?
- Do I already know some things about this?
- What are some necessary steps?
- Are there useful skills I have access to?
- What strategies do I know that could help?
- Is there a time frame for this goal?

ACTION-REFLECTION



- Do I get the feeling my plan is working?
- Are there things I still find confusing?
- What questions have come up?
- Does it look like I will complete this?
- What extra information may be helpful?
- What other strategies could I try?

POST-REFLECTION



- How closely did I reach guidelines of the goal?
- Am I missing anything in the finished product?
- What strategies were useful in the end?
- What would I do differently next time?
- Can I apply what I have done here elsewhere?
- Is there any aspect I am still unsure about?

Tweet It Out

Not necessarily connected to social media, this activity works by confining students to a word limit, forcing deep reflection on the essential components (if summarizing an idea) or in the clarity of word-choice (if addressing their learning cycle). This could be modified for any point in The Reflective Cycle and could also be made into a more complex reflective activity by having students first bullet-points the essentials, then moving through one or two drafts to show how communication can be improved.

Example of a student attempting a Tweet It Out (first draft)

Tweet It Out: Explain the strategy(s) you use to create a model of an atom.

First we always have to have our periodic table because that tells us how to find the stuff we need for building atoms. Because we know atoms are neutral you have to remember that because it helps you know the protons and electrons are the same. The atomic number is the number on the top and is how many protons to add to the middle and electrons around it. The neutrons you have to find by doing math subtracting protons from the mass number.

~Iomin Reflections

Pick One

This is a longer version of a Quick Think with loads of potential variation. Guide students to select one idea or concept from the learning, a key sentence from the reading, or perhaps just a single term as a prompt for deep reflection. Students could reflect on their understanding of the selected item, on its importance to the overall learning, or on their personal experience, connection, or interest.

Mapping

Simple concept-mapping may be overlooked as a method of reflection; however, it requires students to make a visual representation of connected ideas and allows for a different style of reflection that students may appreciate over traditional writing. While typically used for mapping related curricular content, consider how it could be used at any point in The Reflective Cycle to help organize strategies for learning or plans for a larger goal.

Re-Read

Having students reread past reflections to build on knowledge, skills, or strategies, illustrates the recursive nature of the reflective process. This activity can be done using any past reflection with a general connection to be revisited or stacked more specifically as a Pre-Reflection activity followed the same class or the next class as a Post-Reflection follow-up.

+20min Reflections

What If

This activity requires a little more depth of thought from students. Whereas many educators live in anecdotes, analogies, and metaphors, students may find it difficult to create their own. This could be used for content as Action-Reflection, having students reflect on aspects of material to create an analogy or metaphor. It could also be employed as Post-Reflection on the learning process, by having students reflect on individual strategies or a process they used to create an analogy or metaphor.

Get Real

A specific version of What If, here students are asked to consider the idea, concept, or strategy being developed in class, and find a real world example of its application. This could be educator-initiated, by showing a news clip or video of the concept being applied in life and asking students to reflect, or by asking students to find or create their own real world application or example scenario.

Freestyle

While these reflections could start from one of the prompts, as students get more familiar drawing on their experience, prior knowledge, and learning to create a deep reflection, the Freestyle could be reduced to a one-word prompt. Consider a Post-Reflection Freestyle prompt such as “Reflect on this fractions unit.” A student new to reflection may be overwhelmed; however, after extended practice with some of the activities from our list, students may find this a wonderfully liberating reflection and might mash-up

components from past reflective activities (like What If or Mapping).

The list above doesn't include the mother-of-all reflective activities, the "portfolio." There are lots of accessible resources that explore the potential of having students create portfolios of selected artifacts, curate resources, and demonstrate reflective thought as a measure of learning. The common understanding of reflection is as a post-event activity and it is common for educators to use these Post-Reflections in assessment situations (as I have done as well). So, while these reflective activities can be included as artifacts in any portfolio, I have decided to not include this avenue of assessment. The prompts listed under Post-Reflection could also be used to create a post-assessment assignment of sorts if one so wishes; however, I will not specifically discuss assessment-based reflections.

BOTTOM LINE

There is lots of variation to start students reflecting, from quick margin symbols to long writing assignments—research says that prompts may be the key, but their potential application is only limited by imagination (and time...).

*Dewey (1909), p.3

7. Reflective Activities - Summary

REFLECTIVE ACTIVITIES

1 ON THE SIDE

Simple reflective margin symbols.

2 QUICK THINK

Short reflections from prompts or sentence stems.

3 TWEET IT OUT

Summary reflections focused on the essentials.



4 PICK ONE

Select a idea or concept of interest and reflect.

5 MAPPING

Make a visual reflection of connected thoughts.

6 RE-READ

Reflect on changes over a past reflection



7 WHAT IF

Reflect by creating an analogy or metaphor.

8 GET REAL

Reflect on a connection to a real-world example.

9 FREESTYLE

An open reflection from any point of personal interest.



8. Choice in Today's Classroom

*“Learners need to reflect to document; and in the process of documenting, they reflect.”**

What Tech Should We Focus On?

As we discussed in the first chapter, digital learning is a common occurrence in classrooms and no discussion on a learning strategy would be complete without a look at available technology for support. However, the research on technology use with reflection is disappointingly thin—some video use, but most limited to traditional written reflections moved to web-based text.⁶ And as it is common for innovation to outpace research, it leaves us a continuous stream of new and untested applications with which to engage students in reflection, making it necessary to speak in generalities. Not only do apps and programs change overtime, but each school, division, or district may have restrictions on what is available or approved for use by its educators. What doesn’t change? The functions and possibilities within written, verbal, audio, and visual modes of reflection. In my experience, most schools allow for the

organization and storage of a student's body of work from either a Microsoft or Google ecosystem. I will structure my suggestions within these confines, but where possible I will also suggest a few easily available and user-friendly applications that could help in documenting reflective work and progress.

Pros and Cons of Offering Choice

Studies acknowledge that students reflect differently across media.^{46,47} It seems a plain fact that not all students will succeed with written reflections, and research has noted that its exclusive use can both impede underdeveloped writers and be limiting in scope.⁶ Other research has concluded the use of video provides students who may not typically participate in class an opportunity for giving voice and considerations.³⁶ But before you jump up to get started with reflection, I have to point out that this research has also noted that despite the assumed comfort level of high-school and college-aged students, student participants often lacked the proficiency necessary to use technology. And worse, the research discovered that when given a choice, students will often choose the medium they perceive to be less work—with 75% of participants choosing to use basic word processing technology, and 17% choosing no technology at all⁵—whether due to a lack of skill, self-consciousness, or apathy. Ultimately, students will need training and trust to make use of reflection modalities. So, let us go over some points.

WRITTEN

Possible Activities: *On the Side*, *Tweet It Out*, *Mapping*, *Freestyle*

Possible Technology: [WordPress](#), [Twitter](#), [Padlet](#)

The most traditional of modalities, written reflection can be adapted for any reflective activity over any amount of time, can easily incorporate drawing and images (like Mapping), and can be done with or without tech. So, it isn't surprising that most reflection research is based on written reflective practice (journal writing, blogging etc.) Obviously, writing lends itself well to *On the Side* margin reflections or the multiple drafts needed to create a clear, summarized reflection in a *Tweet It Out* activity. Although it is unlikely to garner excitement in all students, written activities are a predictable entry point for reflection in class and if technology is used it likely requires few additional skills above the basics of word processing.^{5,46} Interestingly, research has speculated that the easy availability and temptation to spell-check, edit, and revise digital-text reflections may hinder the deeper, stream-of-consciousness reflecting that occurs in other media.⁴⁸

ORAL

Possible Activities: Quick Think, Pick One

Possible Technology: standard recording phone apps

Although less commonly used in reflective work, this modality is a quick way to get students discussing reflection and is useful for students who find written work daunting (or are physically limited in completing written work). And technology isn't needed here, which makes it an attractive change of pace. Oral reflections work well as spontaneous and unplanned, making them perfect for our shorter activities like Quick Think or Pick One—use it as part of a peer-to-peer reflective activity, a group reflective activity, or as a teacher-student reflective conversation. However, since a student's verbal reflections will likely be more scattered than a planned reflection, one use of tech could be to have students record or dictate this reflection. There are microphones in most computers and dictate abilities in [Microsoft Word](#), [Microsoft OneNote](#), and [Google Docs](#). Dictation allows a free-thought reflection to be captured and, if needed, converted to written form, adding to its potential in a future recursive reflective activity (like Re-Read) and allowing it to be digitally stored .

AUDIO

Possible Activities: Re-Read, What If

Possible Technology: standard recording phone apps, Flipgrid

Audio reflections should be thought of as a planned and recorded oral reflection. And the chosen reflective activity should be a longer variation that includes time for deep thought. After introducing a reflective activity like What If, have students draft bullet-points of key ideas (with limits to distinguish it from a robust written reflection) to create a more structured and focused reflection. Or have students record themselves in a Re-Read of a past reflection to further develop ideas. Students should have more stamina in recording an independent audio reflection compared to the freer oral reflection done with an audience. With the most basic level of technology, reflections can be recorded and embedded as a straight audio file in programs like [Microsoft OneNote](#), or recorded on a standard phone app, creating an audio file that can be uploaded (and transcribed if necessary) to other programs like [Microsoft Word](#) and [Google Docs](#).

Audio modalities are also a good option for students who would rather not appear on camera. A student brought this to my attention when attempting video reflections using the popular video-capture application, [Flipgrid](#). The student asked if the camera could just be covered to record the audio only (of course!). Bonus—Flipgrid, which was recently purchased by Microsoft, automatically generates [closed captions](#) for all new videos.

While it is possible to record great audio reflections for some of the simpler reflective activities, it is unlikely that students will be able to generate strong and lengthy reflections in one clean take—editing may be needed. Most

applications that record video/audio should have some level of quick and user-friendly editing ability (like [Flipgrid](#)), but prepare to discuss this idea with students to produce stronger reflections. And that's okay! Research has noted that students tasked with reflecting and then editing the work produced deeper reflections due to the recursive nature of having to reflect, edit, review, reflect, and finalize their product.⁴⁸

VIDEO

Possible Activities: Quick Think, Pick One, Get Real

Possible Technology: standard recording phone apps, Flipgrid, Splice, iMovie

Video makes the most sense to introduce in our current classrooms. Most students have phones in their pockets and regularly record both long- and short- length videos for any number of social media accounts, making it suitable for all reflective activities. There is also research to back up the use of video in reflective practice (albeit still limited), with academics noting the relevance of studying the potential of the tools that students already use with some consistency.^{6,36}

Researchers have noticed that in practice, written reflective opportunities are most often directed to the teacher, leading students to write superficially with a design towards what they believe the teacher “wants to hear.”⁶ However, research shows video reflections display more authenticity with a deeper level of active reflection.^{36,48} The researchers explain that video mimics a style of reflection students already experience in social media posts or YouTube videos, aiding student buy-in. Student participants mentioned the intimate, “conversation with myself” style that allows for a more unencumbered reflection.⁶ Video reflections also seem to be unique in inviting re-watching (compared to re-listening or re-reading) allowing for a third person view that has students reflect in a recursive manner different from other media.^{46,48}

While most standard phone apps and camera-enabled computers will be able to create a video file for upload and storage, [Flipgrid](#) is of particular importance and has made strides to attract all educators. Created at the University of

Minnesota in 2014 as a quick-response and group discussion tool, it has the display and functionality of a social media app, embedded with the ability to share a video with a group of users for comment, feedback, and collaboration. Again, similar issues with editing longer reflections exist; but most simple apps like Flipgrid and [Splice](#) should contain user-friendly and at least basic editing functions. And some students may be already familiar with more robust editing software like [iMovie](#) or similar programs. Regardless, be wary of using a video-capturing app for education purposes without first scrutinizing both the applications privacy and sharing agreement and settings, and those of your employer. Be particularly careful with trendy new applications without vetting first.

BOTTOM LINE

Reflection can be accommodated to fit learning in short bursts or over a longer activity and with various tech—research says students need practice with different modalities to gain proficiency and will make use of each in a specific way.

*Kirk & Pitches (2013), p. 215

9. The Hidden Key to Reflective Practice

*“For all self-regulated activities, feedback is an inherent catalyst.”**

Progressing Through Levels of Reflection

In our discussion about why reflection often fails, we addressed two key issues: students are often overconfident in their understanding and students find reflection mentally taxing. Many students may either not see the use, or find it too difficult, to produce anything more than a superficial reflection. Research into reflection has outlined levels of reflective depth. Defined differently by different researchers, I have summarized levels of reflection below.⁴⁴

LEVELS OF REFLECTION



BASIC

Not a reflection, just a direct account of the idea/experience.
Sounds reflective, but, nope.

SURFACE

Mostly an overview but with some light interjected thought, feeling, or interpretation.



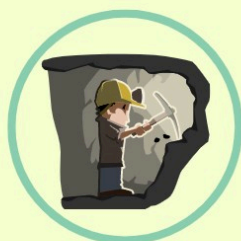
SOLID

No longer an account, but uses points to lead reflective thought, showing a willingness to self-question.




DEEP

Contains self-questioning using an internal dialogue to investigate points, emotions, and perspectives.



Of course, it will not be enough to just explain this briefly to students and get started. The research is clear that explicit, frequent, and direct instruction is necessary to guide students in this journey and see the pay-off of reflective practice in both SRL and academic performance. Below are some instructional tips to consider in facilitating deeper reflection.⁴⁴

TIPS TO GETTING STUDENTS INTO DEEP REFLECTION



- Prepare an outline with descriptions of each level for students to reference.
- Provide exemplars of each level of reflection (for every reflective activity).
- Have students evaluate examples against a created rubric.
- Provide opportunity to practice different modalities.
- Have students practice evaluating self and peer reflections against a rubric.
- Have students create reflections from different perspectives.

The Power of Feedback

Students will need direct instruction on the explicit differences between the levels of reflection, time to practice and improve the quality of their reflections, and feedback on their progress through these levels.⁴⁷ Providing feedback on reflections is no different in its importance than the well-

established need for feedback on assessment. While it often accompanies assessment, feedback is not the same as assessment. It is possible to assess student reflections for clarity or depth, including assigning a mark or grade, if it is an intended learning target, just as you would assess any instructional concept. Likewise, it is possible to provide feedback only to strengthen student reflections as a strategy to further explore other instructional concepts. Feedback in digital learning is one of the most powerful tools to increase student learning.⁴⁹ As mentioned in *The Power of Feedback*⁵⁰, all feedback (whether about the task, process, or self) must answer for students these questions: “Where am I going?” and “How am I doing?” and “Where too next?” (Notice these are also reflective prompts!)

Unfortunately, students may have a bias as to what feedback to accept or ignore, meaning they will need scaffolding and training in how to properly use any feedback to self-assess and improve reflections^{32,50}—this is where instructive use of rubrics and exemplars come in. Rubric-guided feedback on previous reflections helps students to deepen reflection on the next attempt.^{47,48} There are, of course, different ways to provide feedback, and students show greater performance improvements and overall SRL process improvements with teacher-created *video* feedback over text feedback.^{51,52} THAT’S RIGHT, you can use different media too! In your feedback.

Instruction, conversations, rubrics, exemplars, and practice should produce stronger reflections and, through this work, stronger reflective practice should lead to a better understanding of content. Reflective practice can be the process or the outcome. It can be the assessment itself, or

the method by which content understanding is assessed. Communicating the intent with the students is key.

Peer- and Self-Generated Feedback

Too often students leave the feedback to the responsibility of another person (historically the teacher, coach, parent), leaving an outside agent to decide their successes, failures, and next steps. This limits the potential of reflection in general, as so much of reflection as a life-long learner depends on the ability to self-assess. Students with weaker SRL skill rarely ask for feedback from peers (or teachers), while strong SRL students specifically ask for feedback from peers first, before adults.⁵³ This is what makes the use of group-created reflections or paired “critical friend” reflective activities so potent.¹⁸ All the reflective activities mentioned can be adapted to include a peer component, and some modalities also lend themselves easily to peer-generated feedback – such as the embedded commenting, collaborating and responding functions of Flipgrid.

In addition, research has shown that self-regulated learners excel because they respond positively to any outside feedback and also generate internal feedback to improve their processes.⁵³ The ability to monitor your work against the goal and reflect on your progress, is self-generated feedback. I'll stress reflection is feedback. This self-generated feedback can be focused on the quality of the work (assessing against a standard), the quality of the process (assessing success of a strategy), or the quality of the effort (assessing motivation and behaviour). The strength of

reflection as feedback is in its timeliness—no need to wait for an outside agent to have a look.

BOTTOM LINE

Reflections can be superficial or deep and students will need help identifying these levels of thought—research says that creating self-assessment opportunities from feedback is critical to developing deep reflective practice.

*Butler & Winne (1995), p. 246

10. A Final Reflection on Reflection

*“If reflection comes slowly to some people because they have little sense of involvement in their own learning, it comes unwillingly to others because they have little belief in its value for them.”**

The Elephant in the Room

How are we going to do all of this? Is it possible for an educator to incorporate technology, start reflective practice, do project-based or inquiry learning (I know you are thinking about that too), assess adequately and with enough personalization, cover all the necessary content, meet the demands of course requirements, colleagues, administrators, and support social/emotion well-being of students at any moment of need? No. Our jobs are tough, arguably tougher now than ever before. It's okay to pick one thing to start working on and continue working on it until it is engrained in your practice. Then, and only then, consider branching out to try something else, starting all over again. Let that one new thing be reflection.

Through this book I have attempted to convince you that

reflection is the best strategy to both deepen student content learning and improve student independence through SRL. We must show students the value of reflection and guide them to take agency in their current and future learning—this is as important as any curricular outcome. And this takes time! Even the titans of research into SRL and reflection acknowledge the need to prune the curriculum to make space for this type of training.²² But it might not need to be a deep cut, as we have seen we can also wield reflection as a tool for students to explore content.


Training and Frequency Matter

Metacognition is generally undertaught, students have poor motivation, understanding, and belief in reflection (as do some educators), and reflection can be cognitively challenging. We know students will need ample training with robust scaffolding to make this work. And if the vision is to make this skill self-induced—which I believe it should be—to create reflective and self-sufficient learners, teachers will need to persevere through those tough introductory classes and work to get students beyond apathetic superficial reflections. Reflective training often fails when teachers and students don't “stick it out” long enough to see real impact.^{5,32} Teachers can provide lots of opportunity and hope that students uncover an appreciation for reflective practice. Keep the focus and responsibility of learning with the learner. Remember to incorporate as much variety in activity and modality as possible, include group and peer work often, and set up cooperative systems and


opportunities to self-assess the work of others as well as their own.

The Keys to Teaching Reflection

While many of these components have been discussed, or at least mentioned, in this book, here is a summary of the collected recommendations (from all the research, with and without digital learning) for creating a solid and successful reflective practice in your classroom:



The Keys to Teaching Reflection



- Explicit Instruction** – Teach it. Clearly, simply, and often.
- Modelling** – Verbalize your own metacognition as much as possible. Explain your thinking. Tell stories of your practice.
- Scaffolding** – Start with simple activities or prompts and give detailed instructions. Work on deepening these over many attempts before introducing a longer activity.
- Exemplars** – Provide examples of reflective work of different levels of depth for any introduced activity and go over them together.
- Rubrics** – Create a rubric and instruct students in how to evaluate a reflection. Let them use it as a guideline to reflect and to assess their own and others work.
- Feedback** – Don't be the only one who provides feedback. Assess their work but push to have the students assess peer work as well as their own.
- Practice** – Promote habit-forming skills by repeating activities and coming back to review the prompts, rubrics, and depth levels to start each reflection anew.

Taken together, direct instruction incorporating these aspects would provide students with the best chance of developing strong reflective skills to improve performance in any content area and transfer these skills to any situation in their learning future.

BOTTOM LINE

With good planning you can incorporate reflective practice as a skill to improve learning without sacrificing too much content—research says this life-long learning skill is worth the pain of enduring difficult lessons and unsure students.

*Boud et al. (1985), p.97

II. Conclusion

*“Reflection can be done well or poorly, successfully or unsuccessfully, but it is always a productive experience.”**

In writing this book, I have come to accept that while so much of the learning process is still being debated and detailed by academia, while terminology and frameworks are being created and destroyed by competing interpretations, I (like the average educator) just want to know what is best to have students work on— the best *learning* strategy. Until I chose the path that led to this research, I lived the truth that educators don’t have time to review the latest research from educational journals, but they also would like to think that what they try should work. If perhaps you just skipped the Theory section and jumped right in to Practice (and that’s fine), be assured that this is a research-backed book and trust that reflection can work for your students.

The Reflective Cycle is about the content and the process. It is both identifying the important ideas and investigating the strategies for successfully analyzing and understanding. It provides students opportunity to deepen thought, improve their learning process, and master ideas. It will aid students in asking the right questions when it comes time to learn independently, with or without digital learning, in your class or beyond.

If you have been paying attention, the start of this conclusion section had me return to a quote I used in chapter

5, as I found it to be the most inspiring one of them all. While perhaps not especially eloquent, I find it perfectly encapsulates my reality and my own reflective practice: nothing I do ever goes well initially, sometimes not even on the 100th attempt; however, as I continue to reflect and refine, I recognize that what I do matters, and the skills and ideas I hope to encourage and instill in my students matter. And that is what I hope you take away from this book is: Reflection matters.

BOTTOM LINE

Plan, reflect, and adjust. And most importantly, keep trying.

*Trumpower & Sarwar (2015), p. 188

1. Boud, D., Keogh, R., & Walker, D. (Eds) (1985). *Reflection: Turning Experience into Learning*. New York: Routledge.
2. Schön, D. A. (2017). *The Reflective Practitioner: How Professionals Think in Action*. New York: Routledge.
3. Desoete, A., & De Craene, B. (2019). Metacognition and mathematics education: an overview. *ZDM*, 51(4), 565–575.
4. Lew, M. D. N., & Schmidt, H. G. (2011). [Self-reflection and academic performance: Is there a relationship?](#) *Advances in Health Sciences Education*, 16(4), 529.
5. O'Connell, T. S., & Dymont, J. E. (2016). 'I'm just not that comfortable with technology': student perceptions of and preferences for Web 2.0 technologies in reflective journals. *Journal of Further and Higher Education*, 40(3), 392–411.
6. Rose, E. J., Sierschynski, J., Björling, E. A. (2016). [Reflecting on Reflections: Using Video in Learning Reflection to Enhance Authenticity](#). *The Journal of Interactive Technology and Pedagogy*, 9.
7. OECD Future of Education and Skills 2030. (2018). [The Future of Education and Skills: Education 2030. Position paper](#). OECD.
8. Dignath, C., & Büttner, G. (2018). [Teachers' direct and indirect promotion of self-regulated learning in primary and secondary school mathematics classes – insights from video-based classroom observations and teacher interviews](#). *Metacognition and Learning*, 13(2), 127–157.
9. Blomgren, C. (2017). Current Trends and Perspectives in the K-12 Canadian Blended and Online Classroom. In Ostashewski, N., Howell, J., & Cleveland-Innes, M.

- (Eds.), *Optimizing K-12 Education through Online and Blended Learning*(pp. 74-92). IGI Global.
10. Flavell, J. H. (1979). [Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry](#). *American Psychologist*, 34(10), 906-911.
 11. OECD Future of Education and Skills 2030. (2019). [Anticipation-Action-Reflection Cycle for 2030. Concept Note](#). OECD.
 12. Dewey, J. (1909). [How we think](#). Boston: D.C. Heath.
 13. Kalpana, T. (2014). [A Constructivist Perspective on Teaching and Learning: A Conceptual Framework](#). *International Research Journal of Social Sciences*, 3(1), 27-29.
 14. Bonk, C. J. (2009). *The World Is Open: How Web Technology Is Revolutionizing Education*. San Francisco: Jossey-Bass.
 15. Skrypynk, O., Joksimović, S., Kovanović, V., Dawson, S., Gašević, D., Siemens, G. (2015). [The History and State of Blended Learning](#). In George Siemens, Dragan Gašević, & Shane Dawson (Eds.), *Preparing for the digital university: a review of the history and current state of distance, blended, and online learning*. (pp.52-92). Bill & Melinda Gates Foundation.
 16. van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2020). [Effects of self-regulated learning prompts in a flipped history classroom](#). *Computers in Human Behavior*, 108, 106318.
 17. Deekens, V. M., Greene, J. A., & Lobczowski, N. G. (2018). Monitoring and depth of strategy use in computer-based learning environments for science and history. *British Journal of Educational Psychology*, 88(1), 63-79.

18. Van Laer, S., & Elen, J. (2017). [In search of attributes that support self-regulation in blended learning environments](#). *Education and Information Technologies*, 22(4), 1395–1454.
19. Zimmerman, B. J. (2002). [Becoming a Self-Regulated Learner: An Overview](#). *Theory Into Practice*, 41(2), 64–70.
20. Zimmerman, B. J. (2008). [Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects](#). *American Educational Research Journal*, 45(1), 166–183.
21. Butler, D. (2015). Metacognition and self-regulation in learning. In D. Scott & E. Hargreaves (Eds.), *The SAGE Handbook of Learning*(pp. 291-309). SAGE Publications Ltd.
22. Winne, P. H. (2017). Cognition and Metacognition within Self-Regulated Learning. In Patricia A. Alexander, Dale H. Schunk, & Jeffrey A. Greene (Eds.), *Handbook of Self-Regulation of Learning and Performance*. (pp. 36–48). New York: Routledge.
23. Zimmerman, B. J. & Moylan, A. R. (2009). [Self-Regulation: Where Metacognition and Motivation Intersect](#). In D.J. Hacker, J. Dunlosky, & A.C. Graesser (Eds.), *Handbook of Metacognition in Education* (259–277). New York: Routledge.
24. Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: a meta-analysis. *Asia Pacific Education Review*, 17(2), 187–202.
25. Johnson, G., & Davies, S. (2014). [Self-regulated learning in digital environments: theory, research, praxis](#). *British Journal of Research*, 1(2), 1–14.

26. Panadero, E. (2017). [A Review of Self-regulated Learning: Six Models and Four Directions for Research](#). *Frontiers in Psychology*, 8.
27. Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in Educational Theory and Practice* (pp. 277–304). London: Lawrence Erlbaum Associates.
28. Winne, P. H. & Nesbit, J. C. (2009). Supporting Self-Regulated Learning with Cognitive Tools. In D.J. Hacker, J. Dunlosky, & A.C. Graesser (Eds.), *Handbook of Metacognition in Education* (259-277). New York: Routledge.
29. Van der Stel, M., & Veenman, M. V. J. (2014). Metacognitive skills and intellectual ability of young adolescents: a longitudinal study from a developmental perspective. *European Journal of Psychology of Education*, 29(1), 117–137.
30. Tanner, K. D. (2012). [Promoting Student Metacognition](#). *CBE Life Sciences Education*, 11(2), 113–120.
31. Cavilla, D. (2017). [The Effects of Student Reflection on Academic Performance and Motivation](#). *SAGE Open*, 7.
32. Van Velzen, J. H. (2017). Eleventh-Grade High School Students' Accounts of Mathematical Metacognitive Knowledge: Explicitness and Systematicity. *International Journal of Science and Mathematics Education*, 14(2), 319–333.
33. Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., Norman, M. K., & Mayer, R. E. (2010). [How Learning Works: Seven Research-Based Principles for Smart Teaching](#). San Francisco: Jossey-Bass.

34. Jansen, R. S., van Leeuwen, A., Janssen, J., Conijn, R., & Kester, L. (2020). [Supporting learners' self-regulated learning in Massive Open Online Courses](#). *Computers & Education*, 146, 103771.
35. Verpoorten, D., & Westera, W. (2016). [Structured reflection breaks embedded in an online course – effects on learning experience, time on task and performance](#). *Interactive Learning Environments*, 24(3), 606–624.
36. Villamizar, A. G., & Mejía, G. (2019). [Fostering learner autonomy and critical reflection through digital video-journals in a university foreign language course](#). *Reflective Practice*, 20(2), 187–200.
37. Reinholz, D. L. (2016). Developing mathematical practices through reflection cycles. *Mathematics Education Research Journal*, 28(3), 441–455.
38. Sarwar, G. S., & Trumpower, D. L. (2015). [Effects of conceptual, procedural, and declarative reflection on students' structural knowledge in physics](#). *Educational Technology Research and Development*, 63(2), 185–201.
39. Hains-Wesson, R., & Young, K. (2017). A collaborative autoethnography study to inform the teaching of reflective practice in STEM. *Higher Education Research & Development*, 36(2), 297–310.
40. Lehmann, T., Hähnlein, I., & Ifenthaler, D. (2014). Cognitive, metacognitive and motivational perspectives on prefection in self-regulated online learning. *Computers in Human Behavior*, 32, 313–323.
41. McAlpine, L., & Weston, C. (2000). Reflection: Issues related to improving professors' teaching and students' learning. *Instructional Science*, 28(5/6), 363–385.

42. Bannert, M. (2006). Effects of Reflection Prompts When Learning with Hypermedia. *Journal of Educational Computing Research*, 35(4), 359–375.
43. Valencia-Vallejo, N., López-Vargas, O., & Sanabria-Rodríguez, L. (2019). [Effect of a metacognitive scaffolding on self-efficacy, metacognition, and achievement in e-learning environments](#). *Knowledge Management & E-Learning: An International Journal*, 11(1), 1–19.
44. Moon, J. A. (2006). *Learning Journals: A Handbook for Reflective Practice and Professional Development*, 2nd Edition. New York: Routledge.
45. Gregory, K., Cameron, C., and Davies, A. (2011). *Self-Assessment and Goal Setting*, 2nd Edition. Courtenay, BC: Connections Publishing.
46. Kirk, C., & Pitches, J. (2013). [Digital reflection: using digital technologies to enhance and embed creative processes](#). *Technology, Pedagogy and Education*, 22(2), 213–230.
47. Parkes, K. A., & Kajder, S. (2010). [Eliciting and Assessing Reflective Practice: A Case Study in Web 2.0 Technologies](#). *International Journal of Teaching and Learning in Higher Education*, 22(2), 218–228.
48. Kajder, S., & Parkes, K. (2012). [Examining Preservice Teachers' Reflective Practice within and across Multimodal Writing Environments](#). *Journal of Technology and Teacher Education*, 20(3), 229–249.
49. Van der Kleij, F. M., Feskens, R. C. W., & Eggen, T. J. H. M. (2015). [Effects of Feedback in a Computer-Based Learning Environment on Students' Learning Outcomes: A Meta-Analysis](#). *Review of Educational Research*, 85(4),

- 475–511.
50. Hattie, J. & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77, 81–112.
 51. Ostrow, K. S., & Heffernan, N. T. (2014). [Testing the Multimedia Principle in the Real World: A Comparison of Video vs. Text Feedback in Authentic Middle School Math Assignments](#). EDM.
 52. Van der Kleij, F., Adie, L., & Cumming, J. (2017). Using video technology to enable student voice in assessment feedback. *British Journal of Educational Technology*, 48(5), 1092–1105.
 53. Clark, I. (2012). [Formative Assessment: Assessment Is for Self-regulated Learning](#). *Educational Psychology Review*, 24, 205–249.

About the Author



Benjamin is an high school Science and Math educator based out of Winnipeg, Manitoba. He is unrelenting in his continued pursuit of self-improvement through life-long learning and does he best to engage and inspire his students to pursue their own challenges and goals. He was educated at the University of Manitoba and Brandon University, and recently received his M.Ed. from the University of Victoria. He balances his time unequally between being an educator, a husband, a father, and a gym-rat.

Back Cover

