

Reflective Practices in Education: A Primer for Practitioners

Haleigh Machost* and Marilyne Stains*

Department of Chemistry, University of Virginia, Charlottesville, Virginia 22903

ABSTRACT

Reflective practices in education are widely advocated for and have become important components of professional reviews. The advantages of reflective practices are many; however, the literature often focuses on the benefits to students, rather than the benefits for the educators themselves. Additionally, the extant literature concerning reflective practices in education is laden with conflicting terminology and complex studies, which can inhibit educators' understanding of reflective practices and prevent their adoption. As such, this *Essay* serves as a primer for educators beginning reflective practices. It briefly describes the benefits to educators and different classifications and modalities of reflection and examines some of the challenges that educators may encounter.

INTRODUCTION

“Reflection” has become a buzzword in academia and has vast array of implications across fields, disciplines, and subdisciplines. When considering reflection about teaching practices, John Dewey, a psychologist and philosopher who was heavily influential in educational reform, provides a relevant description: reflection is “the active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (Dewey, 1933, p. 9). The act of reflection in this context is meant to indicate a *process*, with Dewey highlighting the necessity of active thinking when encountering obstacles and problems. In less philosophical phrasing, reflection entails considering past or present experiences, learning from the outcomes observed, and planning how to better approach similar situations in the future. Consequently, Dewey suggests that educators embark on a journey of continual improvement when engaging in reflective practices. This is in stark contrast to how reflection is used in higher education. For many educators, the only time they engage in reflection is when they are asked to write documents that are used to evaluate whether they should be promoted, receive a raise, or be granted tenure. Reflection, within an evaluation framework, can be counterproductive and prevent meaningful reflections due to perceptions of judgment (Brookfield, 2017).

This gap may result from the particular adaptation of reflections by some academics. The origin of reflective practices lies not in the realm of academia, but rather in professional training. It is often traced back to Donald Schön's instrumental 1983 work *The Reflective Practitioner*, which, while aimed at his target audience of nonacademic professionals, has become foundational for reflective practices in teaching (Munby and Russell, 1989).

In the varied topography of professional practice, there is a high, hard ground where practitioners can make effective use of research-based theory and technique, and there is a swampy lowland where situations are confusing “messes” incapable of technical solution. The difficulty is that the problems of the high ground, however great their technical interest, are often relatively unimportant to clients or to the larger society, while in the swamp are the problems of greatest human concern. (Schön, 1983, p. 42)

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*Address correspondence to: Marilyne Stains
(mstains@virginia.edu) or Haleigh Machost
(hrm6cw@virginia.edu).

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Schön's work on the education of various professionals gained traction, as he diverged from common norms of the time. In particular, he disagreed with separating knowledge and research from practice, and methods from results (Schön, 1983; Newman, 1999). In doing so, he advocated for practical as well as technical knowledge, enabling professionals to develop greater competency in the real-world situations they encounter. Research in the ensuing decades focused on both gaining evidence for the effectiveness of reflective practices (Derwent, 2015; Zahid and Khanam, 2019) and understanding the obstacles that can prevent reflective practices from being adopted (Davis, 2003; Sturtevant and Wheeler, 2019).

This *Essay* is not intended to provide a comprehensive review of this work for use by education researchers; rather, the goal of this *Essay* is to provide a guide, grounded in this literature, to inform beginning reflective practitioners about the benefits of reflections, the different types of reflections that one can engage in, practical advice for engaging in reflective practices, and the potential challenges and corresponding solutions when engaging in reflective practices. It is also intended as a resource for professional development facilitators who are interested in infusing reflective practice within their professional development programs.

WHY SHOULD I ENGAGE IN REFLECTIVE PRACTICES?

Perhaps the best place to begin when discussing reflective practices is with the question “Why do people do it?” It is common to conceptualize reflection about teaching situations as a way to help “fix” any problems or issues that present themselves (Brookfield, 2017). However, this view is counterproductive to the overarching goal of reflective practices—to continually improve one's own efficacy and abilities as an educator. Similar to how there is always a new, more efficient invention to be made, there is always room for improvement by even the most experienced and well-loved educators. People choose to be educators for any number of personal reasons, but often the grounding desire is to help inform, mentor, or guide the next generation. With such a far-reaching aim, educators face many obstacles, and reflective practices are one tool to help mitigate them.

Classrooms are an ever-changing environment. The students change, and with that comes new generational experiences and viewpoints. Updates to technology provide new opportunities for engaging with students and exploring their understanding. New curricula and pedagogical standards from professional organizations, institutions, or departments can fundamentally alter the modes of instruction and the concepts and skills being taught. As described by Brookfield, reflection can act as a “gyroscope,” helping educators stay balanced amid a changing environment (2017, p. 81). Through the process of reflection, practitioners focus on what drives them to teach and their guiding principles, which define how they interact with both their students and their peers. Furthermore, reflective practitioners are deliberately cognizant of the reasoning behind their actions, enabling them to act with more confidence when faced with a sudden or difficult situation (Brookfield, 2017). In this way, reflection can help guide educators through the challenging times they may experience in their careers.

One such obstacle is imposter syndrome, which is all too familiar for many educators (Brems *et al.*, 1994; Parkman,

2016; Collins *et al.*, 2020). It is a sense that, despite all efforts put in—the knowledge gained, the relationships formed, and the lives changed—what one does is never enough and one does not belong. These feelings often lead to a fear of being “discovered as a fraud or non-deserving professional, despite their demonstrated talent and achievements” (Chrousos and Mentis, 2020, p. 749). A part of reflective practices that is often overlooked is the consideration of everything that goes *well*. While it is true that reflective practitioners are aware of areas for improvement in their teaching, it is also true that they acknowledge, celebrate, and learn from good things that happen in their classrooms and in their interactions with students and peers. As such, they are more consciously aware of their victories, even if those victories happen to be small (Brookfield, 2017). That is not to say that reflective practices are a cure-all for those dealing with imposter syndrome, but reflections can be a reminder that their efforts are paying off and that someone, whether it be students, peers, or even the practitioner themselves, is benefiting from their actions. Furthermore, reflecting on difficult situations has the potential for individuals to realize the extent of their influence (Brookfield, 2017).

In a similar vein, reflective practices can help educators realize when certain expectations or cultural norms are out of their direct ability to address. For example, educators cannot be expected to tackle systemic issues such as racism, sexism, and ableism alone. Institutions must complement educators' efforts through, for example, establishment of support systems for students excluded because of their ethnicity or race and the implementation of data-driven systems, which can inform the institutions' and educators' practices. Thus, through reflections, educators can avoid “self-laceration” (Brookfield, 2017, p. 86) and feelings of failure when the problems experienced are multifaceted.

In addition to alleviating “self-laceration,” developing reflective practice and reflective practitioners has been identified as one of four dominant change strategies in the literature (Henderson *et al.*, 2011). Specifically, developing reflective practitioners is identified as a strategy that empowers individual educators to enact change (Henderson *et al.*, 2011). One avenue for such change comes with identifying practices that are harmful to students. Reflecting on teaching experiences and student interactions can allow educators to focus on things such as whether an explanatory metaphor is accessible to different types of students in the class (e.g., domestic and international students), if any particular group of students do not work well together, and whether the curriculum is accessible for students from varied educational and cultural backgrounds. Thus, through the process of reflection, educators grow in their ability to help their students on a course level, and they are better positioned to advocate on their students' behalf when making curricular decisions on a departmental or institutional level.

An additional part of reflection is gathering feedback to enable a holistic view of one's teaching practices. When feedback is given by a trusted peer, this invaluable information can guide chosen teaching methods and ways of explaining new information. When feedback is given by students and that feedback is then acted upon, it demonstrates to the students that their opinions and experiences are taken seriously and fosters a more trusting environment (Brookfield, 2017). Furthermore, when discrepancies arise between the intention of the teacher

TABLE 1. The various conceptualizations and associated types of reflections along with examples of guiding questions

Conceptualization	Types	Examples of questions for reflection within each category
Timing of reflection	Anticipatory	<ul style="list-style-type: none"> • Tomorrow’s class is going to cover a foundational topic. How can I best engage students in the material to encourage deeper interest and understanding?
	Reflection-in-action or contemporaneous	<ul style="list-style-type: none"> • My student is asking me to go over an old topic. Would it be better to repeat my previous verbal explanation or to try to approach the subject with a visual representation on the board?
	Reflection-on-action or retrospective	<ul style="list-style-type: none"> • No one answered questions during class today, so I just answered them myself and moved on. Was this effective for student learning or should I have waited them out or called on specific students?
Depth of reflections	Pre-reflection	<ul style="list-style-type: none"> • Do I have a class today?
	Surface reflection	<ul style="list-style-type: none"> • Did the questions on the quizzes prepare students for the test? • Did using the projector or the chalkboard result in more engagement by the students during lecture?
	Pedagogical reflection	<ul style="list-style-type: none"> • Is what I am practicing in class consistent with the newest findings from the literature? • How can I change the physical layout of my class to foster more student–student interactions?
	Critical reflection	<ul style="list-style-type: none"> • Do my teaching methods equally benefit students of different cultural backgrounds? For instance, is a metaphor that I used in the explanation of a new concept able to be easily understood by international students in the class? • Will the information that students are being graded on ever play a part in their careers, and if not, should those grades be a major contribution to them passing a course required for said career?
Content of reflections	Technical reflection	<ul style="list-style-type: none"> • What evidence is in the literature regarding student outcomes in a lecture environment as compared with group-focused, collaborative environments?
	Reflection-in and on-action	<ul style="list-style-type: none"> • Multiple times during my last lecture, my students had to ask for clarification on the new concepts. The way I am approaching these things was clearly not working. How can I change my lecture to approach difficult information from multiple directions?
	Deliberative reflection	<ul style="list-style-type: none"> • My colleagues say that having students struggle with a topic increases their learning outcomes, but my own experience shows that struggle leads to disengagement and poor grades. Should I make my students initially struggle with difficult topics?
	Personalistic reflection	<ul style="list-style-type: none"> • I worry that my students feel as if they can't come to me with their questions or concerns. How can I change how I approach my students to better show that I am invested in their success and am more than willing to devote time to helping them?
	Critical reflections	<ul style="list-style-type: none"> • Does an assignment required of my students have the potential to invalidate, or make them self-conscious about, a part of their identity? An example would be requiring female students to look at the numbers of articles published by male compared with female authors without discussing any aspects apart from gender, which may contribute to the difference.

and the interpretation of the students, reflection also aids practitioners in verbalizing their reasoning. Through reflection, educators would need to consider past experiences, prior knowledge, and beliefs that led to their actions. As such, reflective practitioners are able to have honest and informed discussions with their students who may be confused or unhappy with a particular decision. Explaining this to students not only models the practice of continuous inquiry and of considering one’s actions, but it also allows students to understand the rationale behind decisions they may not personally agree with, fostering a more productive student–teacher relationship (Brookfield, 2017).

WHAT ARE THE DIFFERENT TYPES OF REFLECTION?

This section aims to summarize and clarify the different ways reflection has been conceptualized in the literature (Table 1). Specifically, reflections have been described based on their timing, depth, and content. Notably, practitioners of reflective

practices must utilize multiple types of reflection in order to more effectively improve different aspects of their teaching (Griffiths and Tann, 1992).

Time-Dependent

To understand the time-dependent conceptualization of reflection, we return to Schön (1983). He defines two particular concepts—“reflection-in-action” and “reflection-on-action”—which are delineated based on the time that the reflection takes place. Reflection-in-action is characterized as practitioners reflecting while simultaneously completing the relevant action. Reflection-on-action encompasses a practitioner reflecting on a past action, analyzing the different influences, and carefully considering the observed or potential outcomes. Reflection-in-action is perceived as more difficult due to the multiple factors that teachers have to consider at once while also ensuring that the lesson carries on.

Later work built on this initial description of time-dependent reflections. In particular, Loughran renamed the original two timings to make them more intuitive and added one time point (Loughran, 2002a). The three categories include: “anticipatory,” “contemporaneous,” and “retrospective,” wherein actions taken, or to be taken, are contemplated before, during, and after an educating experience, respectively. It should be noted that both Loughran’s and Schön’s models are able to function in tandem with the depth- or content-based understandings of reflections, which are described in the next sections.

Depth of Reflections

Conceptualizing reflection in terms of depth has a long history in the literature (see Section 5.1 in the Supplemental Material for a historical view of the depth-based model of reflections). Thankfully, Larrivee (2008a) designed a depth-classification system that encompasses an array of terminologies and explanations pre-existing in the literature. This classification includes a progression in reflective practices across four levels: “pre-reflection,” “surface,” “pedagogical,” and “critical reflection.”

During the pre-reflection stage, educators do not engage in reflections. They are functioning in “survival mode” (Larrivee, 2008a, p. 350; Campoy, 2010, p. 17), reacting automatically to situations without considering alternatives and the impacts on the students (Larrivee, 2008a; Campoy, 2010). At this stage, educators may feel little agency, consider themselves the victims of coincidental circumstances, or attribute the ownership of problems to others such as their students, rather than themselves (Larrivee, 2008a; Campoy, 2010). They are unlikely to question the status quo, thereby failing to consider and adapt to the needs of the various learners in their classrooms (Larrivee, 2008a; Campoy, 2010). While the description of educators at this level is non-ideal, educators at the pre-reflection level are not ill intended. However, the pre-reflective level is present among practitioners, as evidenced in a 2015 study investigating 140 English as a Foreign Language educators and a 2010 analysis of collected student reflections (Campoy, 2010; Ansarin *et al.*, 2015). The presence of pre-reflective educators is also readily apparent in the authors’ ongoing research. As such, being aware of the pre-reflection stage is necessary for beginning practitioners, and this knowledge is perhaps most useful for designers of professional development programs.

The first true level of reflection is surface reflection. At this level, educators are concerned about achieving a specific goal, such as high scores on standardized tests. However, these goals are only approached through conforming to departmental norms, evidence from their own experiences, or otherwise well-established practices (Larrivee, 2008a). In other words, educators at this level question whether the specific pedagogical practices will achieve their goals, but they do not consider any new or nontraditional pedagogical practices or question the current educational policies (Campoy, 2010). Educators’ reflections are grounded in personal assumptions and influenced by individuals’ unexamined beliefs and unconscious biases.

At the pedagogical level, educators “reflect on educational goals, the theories underlying approaches, and the connections between theoretical principles and practice.” (Larrivee, 2008a, p. 343). At this level, educators also consider their own belief systems and how those systems relate to their practices and explore the problem from different perspectives. A representa-

tive scenario at this level includes: teachers contemplating their various teaching methods and considering their observed outcomes in student comprehension, alternative viewpoints, and also the current evidence-based research in education. Subsequently, they alter (or maintain) their previous teaching practices to benefit the students. In doing so, more consideration is given to possible factors than in surface reflection. This category is quite broad due to the various definitions present in the literature (Larrivee, 2008a). However, there is a common emphasis on the theory behind teaching practices, ensuring that practice matches theory, and the student outcomes of enacted teaching practices (Larrivee, 2008a).

The last level of reflection categorized by Larrivee is critical reflection, wherein educators consider the ethical, moral, and political ramifications of who they are and what they are teaching to their students (Larrivee, 2008a). An approachable way of thinking about critical reflection is that the practitioners are challenging their assumptions about what is taught and how students learn. In doing so, educators evaluate their own views, assertions, and assumptions about teaching, with attention paid to how such beliefs impact students both as learners and as individuals (Larrivee, 2005, 2008b). Through practicing critical reflection, societal issues that affect teaching can be uncovered, personal views become evidence based rather than grounded in assumptions, and educators are better able to help a diverse student population.

Larrivee used this classification to create a tool for measuring the reflectivity of teachers (see Section 4.1 of the Supplemental Material).

Content of Reflections

The third type of reflection is one in which *what* is being reflected on is the defining feature. One such example is Valli’s five types of reflection (1997): “technical reflection,” “reflection-in and on-action,” “deliberative reflection,” “personalistic reflection,” and “critical reflection.” Note that Valli’s conceptions of the two types of reflection—reflection-in and on-action, and critical reflection—are congruent with the descriptions provided in the *Time-Dependent* and *Depth* sections of this *Essay*, respectively, and will thus not be detailed in this section.

In a technical reflection, educators evaluate their instructional practices in light of the findings from the research on teaching and learning (Valli, 1997). The quality of this type of reflection is based on the educators’ knowledge of this body of work and the extent to which their teaching practices adhere to it. For example, educators would consider whether they are providing enough opportunities for their students to explain their reasoning to one another during class. This type of reflection does not focus on broader topics such as the structure and content of the curriculum or issues of equity.

Deliberative reflection encompasses “a whole range of teaching concerns, including students, the curriculum, instructional strategies, the rules and organization of the classroom” (Valli, 1997, p. 75). In this case, “deliberative” comes from the practitioners having to debate various external viewpoints and perspectives or research that maybe be in opposition. As such, they have an internal deliberation when deciding on the best actions for their specific teaching situations. The quality of the reflection is based on the educators’ ability to evaluate the various perspectives and provide sound reasoning for their decisions.

Personalistic reflection involves educators' personal growth as well as the individual relationships they have with their students. Educators engaged in this type of reflection thoughtfully explore the relationships between their personal and professional goals and consider the various facets of students' lives with the overarching aim of providing the best experience. The quality of the reflection is based on an educator's ability to empathize.

To manage the limitations of each type of reflections, Valli recommended that reflective practitioners not focus solely on a specific type of reflection, but rather engage with multiple types of reflections, as each addresses different questions. It is important to note that some types of reflections may be prerequisite to others and that some may be more important than others; for example, Valli stated that critical reflections are more valuable than technical reflections, as they address the important issues of justice. The order of Valli's types of reflection provided in Table 1 reflects her judgment on the importance of the questions that each type of reflection addresses.

HOW CAN I ENGAGE IN REFLECTION?

Larrivee suggested that there is not a prescribed strategy to becoming a reflective practitioner but that there are three practices that are necessary: 1) carving time out for reflection, 2) constantly problem solving, and 3) questioning the status quo (Larrivee, 2000). This section of the *Essay* provides a buffet of topics for consideration and methods of organization that support these three practices. This section is intended to assist educators in identifying their preferred mode of reflection and to provide ideas for professional development facilitators to explicitly infuse reflective practices in their programs.

For educators who are new to reflective practices, it is useful to view the methods presented as "transforming what we are already doing, first and foremost by becoming more aware of ourselves, others, and the world within which we live" (Rodgers and Laboskey, 2016, p. 101) rather than as a complete reformation of current methods.

Focus of the Reflection: Critical Incident

When practicing reflection, a critical incident may be identified or presented in order to ignite the initial reflection or to foster deeper thought by practitioners (Tripp, 2011). Critical incidents are particular situations that become the focus of reflections. Farrell described critical incidents in education as unplanned events that hold the potential to highlight misconceptions and foster greater and newer understanding about teaching and learning (2008). These can be situations ranging from students not understanding a foundational concept from a previous course to considering how to navigate the analysis of a data set that includes cultural background and socioeconomic status.

Critical incidents are used, because meaningful reflection is often a result of educators experiencing a problem or some form of cognitive dissonance concerning teaching practices and approaches to their students (Lee, 2005). Therefore, it is most effective to combine techniques, which are outlined later in this section, with a critical incident to force practitioners into a new and difficult positions relating to education. Larrivee details that a sense of "uncertainty, dissonance, dilemma, problem, or conflict" is extremely valuable to personal reflection and growth (2008b, p. 93). Thus, unsettling experiences

encourage changes to action far more than reflecting on typical teaching/learning interactions. This is an inherently uncomfortable experience for the practitioner, as feelings of self-doubt, uncertainty, anger, and self- or peer-rejection can come to the surface (Larrivee, 2008b). Yet, it is when educators are in an uncomfortable position that they are best able to challenge their learned assertions about what they are teaching and how they are supporting their students' learning. This requires a conscious effort on the part of the educator. Humans tend to function automatically based on their past experiences and ingrained beliefs. This results in certain aspects of events being ignored while others become the driving force behind reactions. In a sense, humans have a "filter system" that can unconsciously eliminate the most effective course of action; this results in humans functioning in a cycle in which current, unquestioned beliefs determine which data and experiences are given attention (Larrivee, 2000, p. 295).

Critical incidents highlight any dissonance present in one's actions, enabling practitioners to tackle social, ethical, political, and pedagogical issues that may be systemic to their departments, their fields, or their cultures. Critical incidents foster critical reflection (under the depth- and content-based models) even in novice teachers (Pultorak, 1996; Griffin, 2003). It is *because* of the difficulty and uncertainty posed by critical incidents that they are widely promoted as an invaluable aspect of reflective practices in education. Therefore, the analysis of critical incidents, whether they are case studies or theoretical examples, has been used in educating both pre-service (Griffin, 2003; Harrison and Lee, 2011) and current educators (Benoit, 2013).

Scaffoldings Promoting Reflections

Once a critical incident has been identified, the next step is structuring the reflection itself. Several scaffolding models exist in the literature and are described in Section 3 of the Supplemental Material. As reflections are inherently personal, educators should use the scaffolding that works best for them. Two scaffoldings that have been found to be useful in developing reflective practices are Bain's 5R and Gibbs's reflective cycle.

Bain *et al.* (2002) created the 5R framework to support the development of pre-service teachers into reflective practitioners. The framework includes the following five steps (Bain *et al.*, 2002):

1. **Reporting** involves considering a particular experience and the contextual factors that surround it.
2. **Responding** is when the individual practitioners verbalize their feelings, thoughts, and other reactions that they had in response to the situation.
3. **Relating** is defined as teachers making connections between what occurred recently and their previously obtained knowledge and skill base.
4. **Reasoning** then encourages the practitioners to consider the foundational concepts and theories, as well as other factors that they believe to be significant, in an effort to understand why a certain outcome was achieved or observed.
5. Finally, **reconstructing** is when the teachers take their explanations and uses them to guide future teaching methods, either to encourage a similar result or to foster a different outcome.

This framework facilitates an understanding of what is meant by and required for reflective practices. For a full explanation of Bain's scaffolding and associated resources, see Sections 1.2 and 3.3 in the Supplemental Material.

A popular scaffolding for promoting reflective practices is the reflective learning cycle described by Gibbs (1988). This cycle for reflection has been extensively applied in teacher preparation programs and training of health professionals (Husebø *et al.*, 2015; Ardian *et al.*, 2019; Markkanen *et al.*, 2020). The cycle consists of six stages:

1. **Description:** The practitioner first describes the situation to be reflected on in detail.
2. **Feelings:** The practitioner then explores their feelings and thoughts processes during the situation.
3. **Evaluation:** The practitioner identifies what went well and what went wrong.
4. **Analysis:** The practitioner makes sense of the situation by exploring why certain things went well while others did not.
5. **Conclusions:** The practitioner summarizes what they learned from their analysis of the situation.
6. **Personal action plans:** The practitioner develops a plan for what they would do in a similar situation in the future and what other steps they need to take based on what they learn (e.g., gain some new skills or knowledge).

For a full explanation of Gibbs's scaffolding and associated resources, see Sections 1.3 and 3.4 in the Supplemental Material.

We see these two models as complementary and have formulated a proposed scaffolding for reflection by combining the two models. In Table 2, we provide a short description of each step and examples of reflective statements. The full scaffolding is provided in Section 3.6 of the Supplemental Material.

Even with the many benefits of these scaffolds, educators must keep in mind the different aspects and levels of reflection that should be considered. Especially when striving for higher levels of reflection, the cultural, historical, and political contexts must be considered in conjunction with teaching practices for such complex topics to affect change (Campoy, 2010). For instance, if equity and effectiveness of methods are not contemplated, there is no direct thought about how to then improve those aspects of practice.

Modalities for Reflections

The different scaffolds can be implemented in a wide variety of practices (Table 3). Of all the various methods of reflection, reflective writing is perhaps the most often taught method, and evidence has shown that it is a deeply personal practice (Greiman and Covington, 2007). Unfortunately, many do not continue with reflective writing after a seminar or course has concluded (Jindal Snape and Holmes, 2009). This may be due to the concern of time required for the physical act of writing. In fact, one of the essential practices for engaging in effective reflections is creating a space and time for personal, solitary reflection (Larrivee, 2000); this is partially due to the involvement of "feelings of frustration, insecurity, and rejection" as "taking solitary time helps teachers come to accept that such feelings are a natural part of the change process" while being in a safe environment (Larrivee, 2000, p. 297). It is important to note that reflective writing is not limited to physically writing in

a journal or typing into a private document; placing such a limitation may contribute to the practice being dropped, whereas a push for different forms of reflection will keep educators in practice (Dyment and O'Connell, 2014). Reflective writings can include documents such as case notes (Jindal Snape and Holmes, 2009), reviewing detailed lesson plans (Posthuma, 2012), and even blogging (Alirio Insuasty and Zambrano Castillo, 2010; van Wyk, 2013; Garza and Smith, 2015).

The creation of a blog or other online medium can help foster reflection. In addition to fostering reflection via the act of writing on an individual level, this online form of reflective writing has several advantages. One such benefit is the readily facilitated communication and collaboration between peers, either through directly commenting on a blog post or through blog group discussions (Alirio Insuasty and Zambrano Castillo, 2010; van Wyk, 2013; Garza and Smith, 2015). "The challenge and support gained through the collaborative process is important for helping clarify beliefs and in gaining the courage to pursue beliefs" (Larrivee, 2008b, p. 95). By allowing other teachers to comment on published journal entries, a mediator role can be filled by someone who has the desired expertise but may be geographically distant. By this same logic, blogs have the great potential to aid teachers who themselves are geographically isolated.

Verbal reflections through video journaling (vlogs) follows the same general methods as writing. This method has the potential to be less time intensive (Clarke, 2009), which may lower one of the barriers facing practitioners. Greiman and Covington (2007) identified verbal reflection as one of the three preferred modalities of reflection by student teachers. By recording their verbal contemplations and reflections, practitioners can review their old thoughts about different course materials, enabling them to adjust their actions based on reflections made when observations were fresh in their mind. Students learning reflective practices also noted that recorded videos convey people's emotions and body language—reaching a complexity that is not achievable with plain text or audio (Clarke, 2009).

If writing or video journaling is not appealing, another method to facilitate reflective practices is that of making video recordings of teaching experiences *in vivo*. This differs from vlogs, which are recorded *after* the teaching experiences. A small longitudinal qualitative study indicated that the video recordings allowed participants to be less self-critical and to identify effective strategies they were employing (Jindal Snape and Holmes, 2009). Additionally, beginning teachers found the most value in videotaping their teaching as compared with electronic portfolios and online discussions (Romano and Schwartz, 2005). By recording their teaching practices, practitioners can use a number of clearly outlined self- and peer-assessments, as detailed in Section 4 of the Supplemental Material. However, it should be noted that all three technology-driven methods used in the study by Romano and Schwartz (2005) were helpful for the participants, and as reflective practices are inherently personal, many methods should be considered by practitioners new to purposeful reflection.

Group efforts, such as group discussions or community meetings, can foster reflective thinking, thereby encouraging reflective practices. "The checks and balances of peers' and critical friends' perspectives can help developing teachers recognize when they may be devaluing information or using self-confirming reasoning, weighing evidence with a predisposition to

TABLE 2. Proposed scaffolds for engaging in reflective practices^a

Step	Description	Example
What is the situation?	The practitioner describes only the situational context and the facts of what occurred of what was said; feelings are described in the next step.	I teach a general chemistry course. Yesterday, after an out-of-class review session before the midterm, a student came up to me. Everyone else had left the room, and it was just the two of us. She asked me what an intermolecular force (IMF) was, which is a subject covered in the first month of the course. I asked her which force she was talking about—London dispersion, dipole-dipole, or H-bonds—to which she replied that she didn't know what any of those were. I told her that she should already know this or have come to me earlier than two days before the test. Her eyes became wide, and she was very quiet while I explained what IMFs are and the different types. She then left without saying anything else. This morning, she did not come to class, which was the final review before the midterm on Friday.
How did you feel?	The practitioner responds and gives their interpretation of the situation, with a particular focus on their own thoughts and feelings as well as those of others involved in the situation.	Right before my interaction with this student, I was actually pretty happy. The review session had gone well. When the question was asked, I was initially confused, because I didn't understand how she didn't address foundational topic before. I was a little bit shocked when she said that she had no idea what IMFs were in general. I think my blurted-out statement probably made her feel embarrassed or like she was going to fail the upcoming test. At the time, I was not concerned with what I said, as I was mainly worried about her possibly failing the course, and I also was frustrated with her for not seeking help before it was too late. After seeing that she chose not to come to class today, I am really worried that I may have discouraged her from the subject altogether. I hope she isn't going to drop the class. If she does, I feel like it would be partially my fault.
Has something similar happened before?	The experience that is being reflected upon is related to any prior knowledge or previous experiences of the practitioner. It should be noted that relating a specific experience to a previous situation is not always possible; in such an instance, this step can be skipped.	Weirdly, this is similar as to when I was working with a postdoc I hired a few years ago. He was international and had missed a deadline for filing for their visa, and when he approached me to get help with this problem, the first words out of my mouth were “How could you miss the deadline?” It was a similar situation, in that I spoke without thinking, and my concern for the other person involved in the conversation took over my thought processes to the detriment of my brain-to-mouth filter. This then resulted in me giving a response which was completely unhelpful and only served to increase another person's anxiety or feelings of “I messed up.” However, with the post doc, I was speaking to an adult aged 28 who had just seriously jeopardized their job. Additionally, while I was his boss, we were close to being peers in both age and experience level. This is a direct contrast to the student who was either 18 or 19 and may not have even wanted to pursue STEM. She was also my student which forces an unfortunate power dynamic into the situation. I think the common factor between these two situations is that when my brain goes into “panic mode” I say whatever is on my mind, and even I myself do not always agree with those initial, panicky thoughts. I have the knowledge about how to correct this, but I need to work on making “think before you speak” a habit when I become frazzled rather than just a habit during more normal conversations.
Why were the outcomes as described?	The situation is then evaluated; the practitioner makes sense of the experience by 1) exploring why certain aspects went well while others did not, 2) considering whether they had the adequate knowledge and skills to handle the situation, and 3) considering what someone who has experience with this type of situation would have done.	When speaking with my student, it was good that she approached me to get help, and I explained the concept well. However, I made her, most likely, feel insecure and judged by my comment. Her not coming to the review the following day was likely due to my actions. I know my mentors from both undergrad and grad school would have first explained the concepts and then patiently asked their student if they were all right and if there were any extenuating circumstances that they needed an extension for. They would have approached with understanding rather than disbelief. I have the skills necessary to do the same thing, but apparently not the impulse control. As I think about it, I may have discouraged my student from the subject completely. Our department sees too few female applicants, and I hate to lose those that do choose to come here, especially due to my dumb, thoughtless comment.
What will you do going forward?	The practitioner concludes by articulating what was learned with an emphasis on how to react to similar situations in the future. Based on this analysis, a plan is created to guide future steps toward achieving change.	I have a problem with blurting out my initial thoughts when I am surprised. I need to learn how to delay my reactions to unexpected situations. As a next step, I will become more mindful of thinking before speaking in all conversations to hopefully force that action to be an ingrained habit. In the future, I will be open to people coming to me with any level of question and will specifically phrase my words to not imply a negative judgment. Something I read about in a journal was the need for more formative feedback for teachers. I may have students give anonymous questions or comments partway through the semester, rather than just the end of course evaluations, to try and catch gaps in understanding like what occurred with this student.

^aAn expanded version is provided in Section 3.6 of the Supplemental Material.

TABLE 3. Common methods to engage in reflective practices

Method	Individual reflections			Reflections in a community		
	Writings	Blogs	Vlogs	Video Recordings	Group Discussions	Practitioner/Observer
Critical incident	A case study, hypothetical situation, or personal experience			The teaching activity that is recorded	A case study, hypothetical situation, or personal experience that is posed to the group	The teaching activity that is observed
Specific benefits	Ability to be vulnerable without fear of consequences	Access an online, diverse, supportive community	Lower time commitment than physically journaling or writing a blog	The opportunity to retroactively analyze the actions and responses of all participants	Exposure to alternative viewpoints to directly challenge previously held assertions	Specific practices highlighted as effective or as needing improvement

confirm a belief or theory, rather than considering alternative theories that are equally plausible” (Larrivee, 2008b, p. 94). These benefits are essential to help educators reach the higher levels of reflection (i.e., pedagogical reflection and critical reflection), as it can be difficult to think of completely new viewpoints on one’s own, especially when educators are considering the needs of diverse students yet only have their own experiences to draw upon. Henderson *et al.* (2011) review of the literature found that successful reports of developing reflective practitioners as a strategy for change had two commonalities. One of these was the presence of either a community where experiences are shared (Gess-Newsome *et al.*, 2003; Henderson *et al.*, 2011) or of an additional participant providing feedback to the educator (Penny and Coe, 2004; McShannon and Hynes, 2005; Henderson *et al.*, 2011). The second commonality was the presence of support by a change agent (Hubball *et al.*, 2005; Henderson *et al.*, 2011), which is far more context reliant.

Even in the absence of change agent support, peer observation can be implemented as a tool for establishing sound reflective practices. This can be accomplished through informal observations followed by an honest discussion. It is vital for the correct mindset to be adopted during such a mediation session, as the point of reflection is in assessing the extent to which practitioners’ methods allow them to achieve their goals for student learning. This cannot be done in an environment where constructive feedback is seen as a personal critique. For example, it was found that peers who simply accepted one another’s practices out of fear of damaging their relationships did not benefit from peer observation and feedback (Manouchehri, 2001); however, an initially resistant observer was able to provide valuable feedback after being prompted by the other participant (Manouchehri, 2001). One approach to ensure the feedback promotes reflections is for the observer and participant to meet beforehand and have a conversation about areas on which to focus feedback. The follow-up conversation focuses first on these areas and can be expanded afterward to other aspects of the teaching that the observer noticed. Observation protocols (provided in Section 4.2 in the Supplemental Material) can also be employed in these settings to facilitate the focus of the reflection.

For those interested in assessing their own or another’s reflection, Section 4 in the Supplemental Material will be helpful, as it highlights different tools that have been shown to be effective and are adaptable to different situations.

WHAT BARRIERS MIGHT I FACE?

It is typical for educators who are introducing new practices in their teaching to experience challenges both at the personal and contextual levels (Sturtevant and Wheeler, 2019). In this section, we address the personal and contextual barriers that one may encounter when engaging in reflective practices and provide advice and recommendations to help address these barriers. We also aim to highlight that the difficulties faced are commonly shared by practitioners embarking on the complex journey of becoming reflective educators.

Personal Barriers

Professional development facilitators who are interested in supporting their participants’ growth as reflective practitioners will need to consider: 1) the misunderstandings that practitioners may have about reflections and 2) the need to clearly articulate the purpose and nature of reflective practices. Simply asking practitioners to reflect will not lead to desirable results (Loughran, 2002b). Even if the rationale and intent is communicated, there is also the pitfall of oversimplification. Practitioners may stop before the high levels of reflection (e.g., critical reflection) are reached due to a lack of in-depth understanding of reflective practices (Thompson and Pascal, 2012). Even if the goals are understood and practitioners intend to evaluate their teaching practices on the critical level, there can still be confusion about what reflective practices require from practitioners. The theory of reflective practices may be grasped, but it is not adequately integrated into how practitioners approach teaching (Thompson and Pascal, 2012). We hope that this *Essay* and associated Supplemental Material provide a meaningful resource to help alleviate this challenge.

A concern often raised is that the level of critical reflection is not being reached (Ostorga, 2006; Larrivee, 2008a). Considering the impacts that student–teacher interactions have on students beyond the classroom is *always* a crucial part of being an educator. In terms of practicality, situations being

considered may not be conducive to this type of reflection. Consider an educator who, after a formative assessment, realizes that students, regardless of ethnicity, nationality, or gender, did not grasp a foundational topic that is required for the rest of the course. In such a case, it is prudent to consider *how* the information was taught and to change instructional methods to adhere to research-based educational practices. If the information was presented in a lecture-only setting, implementing aspects of engagement, exploration, and elaboration on the subject by the students can increase understanding (Eisenkraft, 2003). If the only interactions were student–teacher based and all work was completed individually, the incorporation of student groups could result in a deeper understanding of the material by having students act as teachers or by presenting students with alternative way of approaching problems (e.g., Michaelsen *et al.*, 1996). Both of these instructional changes are examples that can result from pedagogical reflection and are likely to have a positive impact on the students. As such, educators who practice any level of reflection should be applauded. The perseverance and dedication of practitioners cannot be undervalued, even if their circumstances lead to fewer instances of critical reflection. We suggest that communities of practice such as faculty learning communities, scholarship of teaching and learning organizations, or professional development programs are excellent avenues to support educators (Baker *et al.*, 2014; Bathgate *et al.*, 2019; Yik *et al.*, 2022a,b), including in the development of knowledge and skills required to reach critical reflections. For example, facilitators of these communities and programs can intentionally develop scaffolding and exercises wherein participants consider whether the deadlines and nature of assignments are equitable to all students in their courses. Professional development facilitators are strongly encouraged to be explicit about the benefits to individual practitioners concomitantly with the benefits to students (see Section 2 in the Supplemental Material), as benefits to practitioners are too often ignored yet comprise a large portion of the reasoning behind reflective practices.

At a practitioner’s level, the time requirement for participating in reflective practices is viewed as a major obstacle, and it would be disingenuous to discount this extensive barrier (Greiman and Covington, 2007). Reflective practices do take time, especially when done well and with depth. However, we argue that engagement in reflective practice early on can help educators become more effective with the limited time they do have (Brookfield, 2017). As educators engage in reflective practices, they become more aware of their reasoning, their teaching practices, the effectiveness of said practices, and whether their actions are providing them with the outcomes they desire (Thompson and Pascal, 2012). Therefore, they are able to quickly and effectively troubleshoot challenges they encounter, increasing the learning experiences for their students. Finally, we argue that the consistent engagement in reflective practices can significantly facilitate and expedite the writing of documents necessary for annual evaluations and promotions. These documents often require a statement in which educators must evaluate their instructional strategies and their impact on students. A reflective practitioner would have a trail of documents that can easily be leveraged to write such statement.

Contextual Factors

Environmental influences have the potential to bring reflective practices to a grinding halt. A paradigm shift that must occur to foster reflective teacher: that of changing the teacher’s role from a knowledge expert to a “pedagogic expert” (Day, 1993). As with any change of this magnitude, support is necessary across all levels of implementation and practitioners to facilitate positive change. Cole (1997) made two observations that encapsulate how institutions can prevent the implementation of reflective practices: first, many educators who engage in reflective practices do so secretly. Second, reflections are not valued in academic communities despite surface-level promotions for such teaching practices; institutions promote evidence-based teaching practices, including reflection, yet instructors’ abilities as educators do not largely factor into promotions, raises, and tenure (Brownell and Tanner, 2012; Johnson *et al.*, 2018). The desire for educators to focus on their teaching can become superficial, with grants and publications mattering more than the results of student–teacher interactions (Cole, 1997; Michael, 2007).

Even when teaching itself is valued, the act of changing teaching methods can be resisted and have consequences. Larrivee’s (2000) statement exemplifies this persistent issue:

Critically reflective teachers also need to develop measures of tactical astuteness that will enable them to take a contrary stand and not have their voices dismissed. One way to keep from committing cultural suicide is to build prior alliances both within and outside the institution by taking on tasks that demonstrate school loyalty and build a reputation of commitment. Against a history of organizational contributions, a teacher is better positioned to challenge current practices and is less readily discounted. (p. 298)

The notion that damage control must be a part of practicing reflective teaching is indicative of a system that is historically opposed to the implementation of critical reflection (Larrivee, 2000). We view this as disheartening, as the goal of teaching should be to best educate one’s students. Even as reflective practices in teaching are slowly becoming more mainstream, contextual and on-site influences still have a profound impact on how teachers approach their profession (Smagorinsky, 2015). There must be a widespread, internal push for change within departments and institutions for reflective practices to be easily and readily adopted.

The adoption of reflective practices must be done in a way that does not negate its benefits. For example, Galea (2012) highlights the negative effects of routinizing or systematizing this extremely individual and circumstance-based method (e.g., identification of specific areas to focus on, standardized timing and frequency of reflections). In doing so, the systems that purportedly support teachers using reflection remove their ability to think of creative solutions, limit their ability to develop as teachers, and can prevent an adequate response to how the students are functioning in the learning environment (Tan, 2008). Effective reflection can be stifled when reflections are part of educators’ evaluations for contract renewal, funding opportunities, and promotions and tenure. Reflective practices are inherently vulnerable, as they involve both being critical of oneself and taking responsibility for personal actions (Larrivee, 2008b).

Being open about areas for improvement is extremely difficult when it has such potential negative impacts on one's career. However, embarking on honest reflection privately, or with trusted peers and mentors, can be done separately from what is presented for evaluation. We argue that reflections can support the writing of documents to be considered for evaluation, as these documents often request the educators to describe the evolution of their teaching and its impact on students. Throughout course terms, reflections conducted privately can provide concrete ideas for how to frame an evaluation document. We argue that administrators, department chairs, and members of tenure committees should be explicit with their educators about the advantages of reflective practices in preparing evaluative documents focused on teaching.

CONCLUDING THOUGHTS

Reflective practices are widely advocated for in academic circles, and many teaching courses and seminars include information regarding different methods of reflection. This short introduction intends to provide interested educators with a platform to begin reflective practices. Common methods presented may appeal to an array of educators, and various self- and peer-assessment tools are highlighted in Section 4 in the Supplemental Material. Reflective practices are a *process* and a time- and energy-intensive, but extremely valuable tool for educators when implemented with fidelity. Therefore, reflection is vital for efficacy as an educator and a requirement for educators to advance their lifelong journeys as learners.

To conclude, we thought the simple metaphor provided by Thomas Farrell best encapsulates our thoughts on reflective practices within the context of teaching: Reflective practices are “a compass of sorts to guide teachers when they may be seeking direction as to what they are doing in their classrooms. The metaphor of reflection as a compass enables teachers to stop, look, and discover where they are at that moment and then decide where they want to go (professionally) in the future” (Farrell, 2012, p. 7).

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REFERENCES

- Alirio Insuasty, E., & Zambrano Castillo, L. C. (2010). Exploring reflective teaching through informed journal keeping and blog group discussion in the teaching practicum. *Profile Issues in Teachers Professional Development*, 12(2), 87–105.
- Ansarini, A. A., Farrokhi, F., & Rahmani, M. (2015). Iranian EFL teachers' reflection levels: The role of gender, experience, and qualifications. *Asian Journal of Applied Linguistics*, 2(2), 140–155.
- Arlian, P., Hariyati, R. T. S., & Affah, E. (2019). Correlation between implementation case reflection discussion based on the Graham Gibbs Cycle and nurses' critical thinking skills. *Enfermeria Clinica*, 29, 588–593.
- Bain, J., Ballantyne, R., Mills, C., & Lester, N. (2002). *Reflecting on practice: Student teachers' perspectives*. Flaxton, QLD, Australia: Post Pressed.
- Baker, L. A., Chakraverty, D., Columbus, L., Feig, A. L., Jenks, W. S., Pilarz, M., ... & Wesemann, J. L. (2014). Cottrell Scholars Collaborative New Faculty Workshop: Professional development for new chemistry faculty and initial assessment of its efficacy. *Journal of Chemical Education*, 91(11), 1874–1881.
- Bathgate, M. E., Aragón, O. R., Cavanagh, A. J., Frederick, J., & Graham, M. J. (2019). Supports: A key factor in faculty implementation of evidence-based teaching. *CBE—Life Sciences Education*, 18(2), ar22.
- Benoit, A. (2013). *Learning from the inside out: A narrative study of college teacher development* [Doctoral Dissertation, Lesley University]. Graduate School of Education. https://digitalcommons.lesley.edu/education_dissertations/29
- Brems, C., Baldwin, M. R., Davis, L., & Namyniuk, L. (1994). The imposter syndrome as related to teaching evaluations and advising relationships of university faculty members. *Journal of Higher Education*, 65(2), 183–193.
- Brookfield, S. D. (2017). *Becoming a critically reflective teacher*. Hoboken, NJ: Wiley.
- Brownell, S. E., & Tanner, K. D. (2012). Barriers to faculty pedagogical change: Lack of training, time, incentives, and ... tensions with professional identity? *CBE—Life Sciences Education*, 11(4), 339–346.
- Campoy, R. (2010). Reflective thinking and educational solutions: Clarifying what teacher educators are attempting to accomplish. *SRATE Journal*, 19(2), 15–22.
- Chrousos, G. P., & Mentis, A.-F. A. (2020). Imposter syndrome threatens diversity. *Science*, 367(6479), 749–750.
- Clarke, L. (2009). Video reflections in initial teacher education. *British Journal of Educational Technology*, 40(5), 959–961.
- Cole, A. L. (1997). Impediments to reflective practice: Toward a new agenda for research on teaching. *Teachers and Teaching*, 3(1), 7–27.
- Collins, K. H., Price, E. F., Hanson, L., & Neaves, D. (2020). Consequences of stereotype threat and imposter syndrome: The personal journey from Stem-practitioner to Stem-educator for four women of color. *Taboo: The Journal of Culture and Education*, 19(4), 10.
- Davis, M. (2003). Barriers to reflective practice: The changing nature of higher education. *Active Learning in Higher Education*, 4(3), 243–255.
- Day, C. (1993). Reflection: A necessary but not sufficient condition for professional development. *British Educational Research Journal*, 19(1), 83–93.
- Dervent, F. (2015). The effect of reflective thinking on the teaching practices of preservice physical education teachers. *Issues in Educational Research*, 25(3), 260–275.
- Dewey, J. (1933). *How we think*. Chelmsford, MA: Courier Corporation.
- Dymont, J. E., & O'Connell, T. S. (2014). When the ink runs dry: Implications for theory and practice when educators stop keeping reflective journals. *Innovative Higher Education*, 39(5), 417–429.
- Eisenkraft, A. (2003). Expanding the 5 E model: A purposed 7 E model emphasizes “transfer of learning” and the importance of eliciting prior understanding. *Science Teacher*, 70(6), 56–59.
- Farrell, T. S. (2008). Critical incidents in ELT initial teacher training. *ELT Journal*, 62(1), 3–10.
- Farrell, T. S. (2012). Reflecting on reflective practice: (Re) visiting Dewey and Schon. *TESOL Journal*, 3(1), 7–16.
- Galea, S. (2012). Reflecting reflective practice. *Educational Philosophy and Theory*, 44(3), 245–258.
- Garza, R., & Smith, S. F. (2015). Pre-service teachers' blog reflections: Illuminating their growth and development. *Cogent Education*, 2(1), 1066550.
- Gess-Newsome, J., Southerland, S. A., Johnston, A., & Woodbury, S. (2003). Educational reform, personal practical theories, and dissatisfaction: The anatomy of change in college science teaching. *American Educational Research Journal*, 40(3), 731–767.
- Gibbs, G. (1988). *Learning by doing: A guide to teaching and learning methods*. London, England: Further Education Unit.
- Greiman, B., & Covington, H. (2007). Reflective thinking and journal writing: Examining student teachers; perceptions of preferred reflective modality, journal writing outcomes, and journal structure. *Career and Technical Education Research*, 32(2), 115–139.

- Griffin, M. L. (2003). Using critical incidents to promote and assess reflective thinking in preservice teachers. *Reflective Practice, 4*(2), 207–220.
- Griffiths, M., & Tann, S. (1992). Using reflective practice to link personal and public theories. *Journal of Education for Teaching, 18*(1), 69–84.
- Harrison, J. K., & Lee, R. (2011). Exploring the use of critical incident analysis and the professional learning conversation in an initial teacher education programme. *Journal of Education for Teaching, 37*(2), 199–217.
- Henderson, C., Beach, A., & Finkelstein, N. (2011). Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching, 48*(8), 952–984.
- Hubball, H., Collins, J., & Pratt, D. (2005). Enhancing reflective teaching practices: Implications for faculty development programs. *Canadian Journal of Higher Education, 35*(3), 57–81.
- Husebø, S. E., O'Regan, S., & Nestel, D. (2015). Reflective practice and its role in simulation. *Clinical Simulation in Nursing, 11*(8), 368–375.
- Jindal-Snape, D., & Holmes, E. A. (2009). A longitudinal study exploring perspectives of participants regarding reflective practice during their transition from higher education to professional practice. *Reflective Practice, 10*(2), 219–232.
- Johnson, E., Keller, R., & Fukawa-Connelly, T. (2018). Results from a survey of abstract algebra instructors across the United States: Understanding the choice to (not) lecture. *International Journal of Research in Undergraduate Mathematics Education, 4*, 254–285.
- Larrivee, B. (2000). Transforming teaching practice: Becoming the critically reflective teacher. *Reflective Practice, 1*(3), 293–306. <https://doi.org/doi:10.1080/14623940020025561>
- Larrivee, B. (2005). *Authentic classroom management: Creating a learning community and building reflective practice*. Boston, MA: Allyn & Bacon.
- Larrivee, B. (2008a). Development of a tool to assess teachers' level of reflective practice. *Reflective Practice, 9*(3), 341–360. <https://doi.org/10.1080/14623940802207451>
- Larrivee, B. (2008b). Meeting the challenge of preparing reflective practitioners. *New Educator, 4*(2), 87–106.
- Lee, H.-J. (2005). Understanding and assessing preservice teachers' reflective thinking. *Teaching and Teacher Education, 21*(6), 699–715.
- Loughran, J. J. (2002a). *Developing reflective practice: Learning about teaching and learning through modelling*. London, UK: Routledge.
- Loughran, J. J. (2002b). Effective reflective practice: In search of meaning in learning about teaching. *Journal of Teacher Education, 53*(1), 33–43.
- Manouchehri, A. (2001). Collegial interaction and reflective practice. *Action in Teacher Education, 22*(4), 86–97.
- Markkanen, P., Välimäki, M., Anttila, M., & Kuuskorpi, M. (2020). A reflective cycle: Understanding challenging situations in a school setting. *Educational Research, 62*(1), 46–62.
- McShannon, J., & Hynes, P. (2005). Student achievement and retention: Can professional development programs help faculty GRASP it? *Journal of Faculty Development, 20*(2), 87–93.
- Michael, J. (2007). Faculty perceptions about barriers to active learning. *College Teaching, 55*(2), 42–47.
- Michaelsen, L. K., Fink, L. D., & Black, R. H. (1996). What every faculty developer needs to know about learning groups. *To Improve the Academy, 15*(1), 31–57.
- Munby, H., & Russell, T. (1989). Educating the reflective teacher: An essay review of two books by Donald Schon. *Journal of Curriculum Studies, 21*(1), 71–80.
- Newman, S. (1999). Constructing and critiquing reflective practice. *Educational Action Research, 7*(1), 145–163.
- Ostorga, A. N. (2006). Developing teachers who are reflective practitioners: A complex process. *Issues in Teacher Education, 15*(2), 5–20.
- Parkman, A. (2016). The imposter phenomenon in higher education: Incidence and impact. *Journal of Higher Education Theory and Practice, 16*(1), 51.
- Penny, A. R., & Coe, R. (2004). Effectiveness of consultation on student ratings feedback: A meta-analysis. *Review of Educational Research, 74*(2), 215–253.
- Posthuma, B. (2012). Mathematics teachers' reflective practice within the context of adapted lesson study. *Pythagoras, 33*(3), 1–9.
- Pultorak, E. G. (1996). Following the developmental process of reflection in novice teachers: Three years of investigation. *Journal of Teacher Education, 47*(4), 283–291.
- Rodgers, C., & Laboskey, V. K. (2016). Reflective practice. *International Handbook of Teacher Education, 2*, 71–104.
- Romano, M., & Schwartz, J. (2005). Exploring technology as a tool for eliciting and encouraging beginning teacher reflection. *Contemporary Issues in Technology and Teacher Education, 5*(2), 149–168.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York, NY: Basic Books.
- Smagorinsky, P. (2015). The role of reflection in developing eupraxis in learning to teach English. *Pedagogies: An International Journal, 10*(4), 285–308.
- Sturtevant, H., & Wheeler, L. (2019). The STEM Faculty Instructional Barriers and Identity Survey (FIBIS): Development and exploratory results. *International Journal of STEM Education, 6*(1), 1–22.
- Tan, C. (2008). Improving schools through reflection for teachers: Lessons from Singapore. *School Effectiveness and School Improvement, 19*(2), 225–238.
- Thompson, N., & Pascal, J. (2012). Developing critically reflective practice. *Reflective Practice, 13*(2), 311–325. <https://doi.org/https://doi.org/10.1080/14623943.2012.657795>
- Tripp, D. (2011). *Critical incidents in teaching (classic edition): Developing professional judgement*. London, England: Routledge.
- Valli, L. (1997). Listening to other voices: A description of teacher reflection in the United States. *Peabody Journal of Education, 72*(1), 67–88.
- van Wyk, M. M. (2013). Using blogs as a means of enhancing reflective teaching practice in open distance learning ecologies. *Africa Education Review, 10*(Suppl 1), S47–S62.
- Yik, B. J., Raker, J. R., Apkarian, N., Stains, M., Henderson, C., Dancy, M. H., & Johnson, E. (2022a). Association of malleable factors with adoption of research-based instructional strategies in introductory chemistry, mathematics, and physics. *Frontiers in Education, 7*, 1016415.
- Yik, B. J., Raker, J. R., Apkarian, N., Stains, M., Henderson, C., Dancy, M. H., & Johnson, E. (2022b). Evaluating the impact of malleable factors on percent time lecturing in gateway chemistry, mathematics, and physics courses. *International Journal of STEM Education, 9*(1), 1–23.
- Zahid, M., & Khanam, A. (2019). Effect of Reflective Teaching Practices on the Performance of Prospective Teachers. *Turkish Online Journal of Educational Technology—TOJET, 18*(1), 32–43.