Supplemental Material

CBE—Life Sciences Education

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Supplemental Information for

Reflective Practice in Education: A Primer for Practitioners

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The body of the Essay aimed at developing educators' understanding of reflective practices, the potential benefits, and of the obstacles practitioners may face. Additionally, a brief synopsis of different methods of reflection are outlined. This supplementary information is meant to complement the Essay by providing further resources and templates for those wishing to begin reflective practice and who have an idea of the type of reflection method they wish to implement. It is necessary to mention that the resources outlined herein are not an extensive list; in fact, it is quite brief by design. Many more templates and case-studies are available both online and in the literature, and it would be both impossible for the authors and overwhelming for the readers to have an exhaustive list. As such, the objective of this supplementary information is to serve as a diving-off point for more in-depth reading, discovery, and implementation of reflective practices.

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1. Further Readings

1.1. The works of Schön

As mentioned in the Essay's introduction, Schön's work is seminal to reflective practices in education. While he was not the first to conceptualize order of thinking, he was critical to the application towards practice of his philosophical principals. While his work is indeed more theoretical than practical in nature, it provides a sound grounding for anyone interested. Chronologically, his work most relevant to reflective practices begins with "The Reflective Practitioner" in 1983 (Schön, 1983). This was followed by "Educating the Reflective Practitioner" (Schön, 1987) and "Reflective Turn" (Schön, 1991). "Reflective Turn" is unique among these three as it focuses on case studies (Schön, 1991).

1.2. Bain's "Reflecting on Practice"

In 2002, Bain, Ballantyne, Mills, and Lester came together to publish a "living text;" the subject of their work were their efforts on enhancing both the reflective thinking and writing of student teachers. Chapter one covers a brief history of the process of reflection, beginning with Dewey and moving on to Schön and van Manen. This opening also outlines assumptions that their work is grounded in. Importantly, three of these are that reflection is a skill that can be learned and is not inherently known by practitioners, that "reflection can be augmented by the comments and evaluations of professional colleges" and that "reflection should not be focused on just the moral and ethical dilemmas of teaching, but on any matter of professional concern to the student teacher" (Bain et al., 2002, p. 12). Chapter two is the most relevant to educators who are learning how to write reflection; here is where the 5R framework is introduced along with a self-assessment scale. The scale includes three different levels to describe the quality of the reflections for each of the five R's (reporting, responding, relating, reasoning, and reconstructing). It is important to note that the included scale is meant to provide prompts and to encourage deeper thinking. Thus, the scale should not be interpreted as a linear progression nor as a measure of 'good' or 'bad' reflections. The latter five chapters of "Reflecting on Practice: Student

Teachers Perspectives" focus on real world examples and exemplify how reflections can aid educators in addressing different types of challenges. The cases of reflection are paired with feedback, showing how practitioners at any stage are able to continuously improve their ability to write reflectively. Chapter three includes reflections representative of encouraging teaching for learning; this covers topic such as unresponsive students, dealing with mixed abilities among students, and supporting students in thinking about the material being taught. Chapter four is concerned with classroom organization and management. Examples tackle issues such as designing a student-centered environment and forming effective groups. Chapter five highlights reflections dealing with behavior management; topics include dealing with disruptive students and how to take into account student learning styles. Chapter six illustrates professional concerns including potential legal consequences, sexual harassment, and the rights of both students and educators. Chapter seven finishes with reflections about assessment practices. The topics described are on record keeping, the timing of assessments, and setting assessment timelines. The array of examples provided in this work are invaluable to practitioners and model both the aid reflections offer as well as the space for continual improvement by reflective educators. (Bain et al., 2002).

1.3. Gibbs' "Learning by Doing"

In 1988, Gibbs published a guide for how to reflect on *actions and learning experiences* to improve practice (Gibbs, 1988). It should be noted that Gibbs focused on education via demonstrations; however his guide is extremely useful in its detailing of experiential learning cycles which can be applied to a broad range of scenarios, including teacher-student interactions. Chapter 2 of Gibbs' work acts as an introduction to experiential learning theory, and chapter 3 details how different learning styles affect how individuals balance experimentation, experience, conceptualization, and reflection. Chapter 4 continues with a practical-minded explanation of how to implement the experiential learning cycle. Chapter 5 is perhaps the most useful as it details specific practices, such as computer simulations in biology and the thirty second theatre, which foster reflective thinking. Gibbs' guide ends with chapter 6 wherein he

provides insight the challenges of using experiential methods as well as advice for effective implementation. (Gibbs, 1988).

1.4. Brookfield's "Becoming a Critically Reflective Teacher"

This work of Brookfield is longer than Gibbs' guide; however, it contains multiple relatable examples from Brookfield's own teaching career. As the name suggests, "Becoming a Critically Reflective Teacher" primarily focused on critical reflection, meaning contemplating actions through a political, ethical, and moral lens (Brookfield, 2017). This point of view is detailed in section 3 of the manuscript. The books begins by defining critically reflective teaching before delving into the issues of power and hegemony, which permeate academia and teacher/student interactions. The benefits of critical reflection to addressing these issues are discussed in the subsequent chapter 5. After this, he outlines his view of the four lenses of critical reflection: the student's view, colleagues' views, personal experiences, and, finally, the lens of theory. Chapter 13 is particularly insightful as it concerns "negotiating the risks of critical reflection" (Brookfield, 2017). All 14 chapters provide valuable insight into reflective thinking and practice; however, as the focus is solely on critical reflection, practicalities tend to be ignored. As such, this book is an excellent resource for understanding critical reflection, but should not be the sole guide when reflecting on one's own teaching practices (Brookfield, 2017).

2. Critical Incidents

Critical incidents are a vital tool for anyone beginning the journey of becoming a reflective practitioner. However, they can be a foreign concept to many new practitioners and can also, unduly, be associated solely with critical reflection. Furthermore, critical incidents are often described as situations where educators feel uneasy, uncomfortable, or off-kilter during student interactions. However, it is also necessary to take into account an additional viewpoint best summarized by Mohammed: "an 'incident' need not be a dramatic event in the teaching context, just one that makes you stop and think, or one that raises questions for you" (Mohammed, 2016). The reason this view is so vital is that educators consistently have experiences that may benefit them to reflect on. However, in choosing a critical incident, practitioners determine one specific situation to focus on, enabling a deeper understanding of the reasoning and feelings to be found. For practitioners wanting a guide concerning the identification of critical incidents and how to analyze them, Joshi's article "Critical Incidents for Teachers' Professional Development" will prove quite helpful (Joshi, 2018). While Joshi describes various examples of critical incidents and lists many helpful questions and considerations for practitioners to consider, a thorough analysis of a single event is not provided.

The best way to learn about critical incidents and how to analyze them are through reading case studies. Tripp, who pioneered the use of critical incident analysis, provided an example of his approach in 1994 (Tripp, 1994). A rather excellent case study published by Farrell (2013) provides a definition of 'critical incident' on the second page and subsequently details how to analyze one by following his interpretation of McCabe's scaffold (see SI 4.1). However, there is another example from the literature which is a more holistic guide through the entire process of choosing a critical incident, different ways of approaching the critical incident, and the series of questions practitioners must ask themselves (called the 'Why?" challenge) (Mohammed, 2016). Indeed, for educators new to the practice of reflecting on critical incidents, Mohammed's 2016 article, which considers the situation of a disinterested and mildly combative student, is highly recommended.

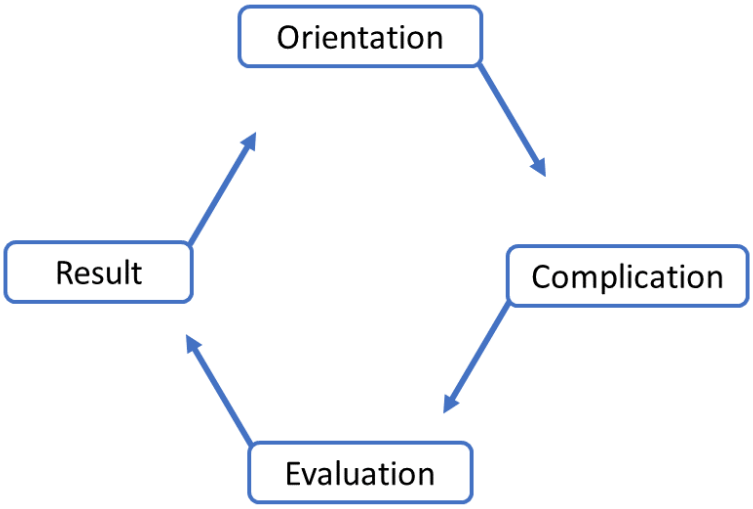
As a final point regarding the importance of critical incident, it is necessary to point out that hypothetical critical incidents can be used as a way to practice reflection. Any of the situations described in case studies could be used by individuals to learn the process of reflection, especially as the depth of their reflections can be compared to the examples provided.

3. Scaffoldings

When first beginning reflective practices, it is difficult to adequately articulate one's feelings, thoughts, and desired outcomes. As such, scaffoldings for reflection have been created. Such frameworks have been shown to help people "formulate and articulate their personal belief system" (Bean & Stevens, 2002), thus enabling reflection.

3.1. McCabe

In 2002, McCabe proposed her framework for structuring reflections: orientation, wherein the general questions of who, when, and where are answered; complication, which outlines the issues or problems with the situation; evaluation, which analyzes the consequences for all participants in the event; and result, wherein a resolution to the issue is made (McCabe, 2002). Many case studies use McCabe's framework. However, the scaffoldings detailed throughout the remainder of this section are more in-depth and segmented, allowing for easier use by practitioners while promoting high-level reflections.



3.2. HCPC

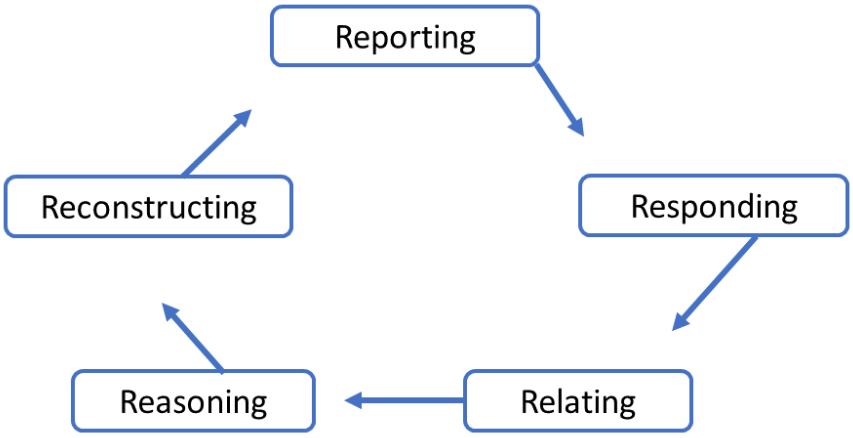
The Health and Care Professions Council proves a broad reflective practice template on their website (*Reflective Practice Template*, 2021). The freely available pdf begins with the poignant statement, "There is no right or wrong way to reflect on your practice." While the document is aimed as health care

professionals, this assertion holds true in regards to the reflections of educators, and the general outline given may prove invaluable for some practitioners. This guide is defined by an order of questions that educators can ask themselves, beginning with “What event or topic are you reflecting on?” Following this, people are asked to describe their topic as either “positive” or “challenging” based upon their feelings about the situation. This brief description is followed by detailing out “what happened?” Subsequently, the practitioner practices “looking back” were they contemplate if they are satisfied with the outcome and what they could have done differently. Finally, they “[look] forward” and decide how to respond in a similar situation with their newfound insights. (*Reflective Practice Template*, 2021).

3.3. Bain’s 5Rs

A scaffold encompassing the 5Rs was presented by the University of Edinburgh and is available online and also summarized herein (*The 5R framework for reflection*, 2018). The framework details potential questions to ask oneself and things to consider for all parts of Bain’s 5Rs (reporting, responding, relating, reasoning, and reconstructing). When reporting on a situation, the description is described as being brief with only key elements highlighted. The response then covers personal feelings and thoughts

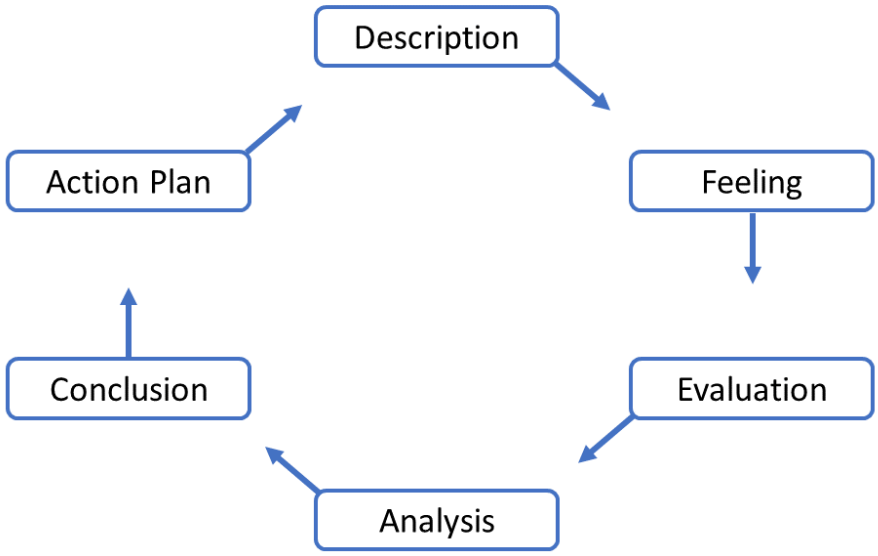
as well as any particular points of confusion that practitioner has. Unique to the 5Rs is then when the educator must relate this specific situation to prior experiences. Both comparisons and differences should be noted, particularly differences which change the contextual factors that the actions take place in. Reasoning is depicted as the section where practitioners make sense of the actions and ensuing outcomes. They also consider how someone with more knowledge, experience, or a different perspective would have acted differently. Finally, the scaffold based on Bain's 5Rs ends with reconstruction where conclusions are drawn and future, similar situations are reframed as a part of planning changes to one's actions. This framework is a direct adaptation of Bain's 2002 paper (Bain et al., 2002); however, the online resource made by the University of Edinburgh includes helpful examples, questions to ask oneself, and phrases to use when addressing each of the 5Rs. As such, it is an extremely valuable resource for practitioners.



3.4. Gibbs

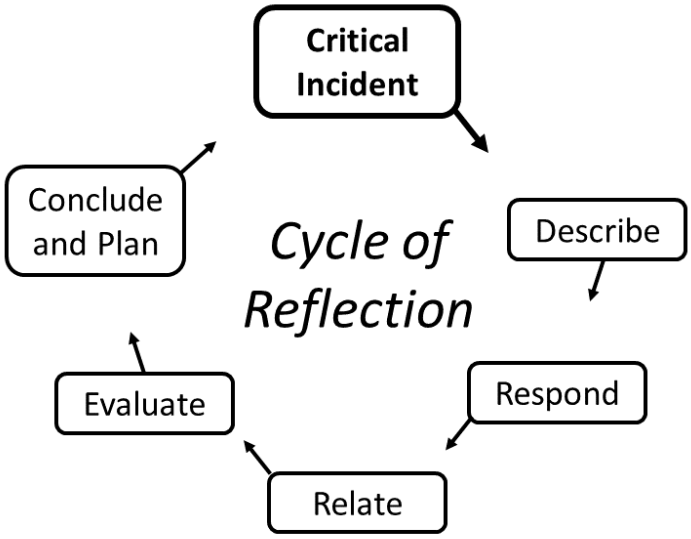
The University of Edinburgh has also made available an additional reflective scaffolding based on Gibbs' reflective cycle (*Gibbs' Reflective Cycle*, 2020). The creators of the University of Edinburgh's online resource distilled Gibb's reflective cycle into description, feeling, evaluation, analysis, conclusion, and action plan. It should be noted that this distillation took more thoughtful consideration as it is not a direct adaptation of Gibbs' 1998 book "Learning by Doing" (Gibbs, 1988; *Gibbs' Reflective Cycle*, 2020). This online, free-to-access framework involves a more detailed description of the situation at hand than is seen with the 5Rs, with practitioners needing to detail what, when, where, and how something occurred as

well as who was present and why the practitioner themselves was in the situation. This factual depiction is followed by reflective writers focusing on their own feelings *and* what they believe other people may have felt during and after the situation. After describing how all participants felt (or may have felt), it is then required to explicitly detail was what positive and went well and to determine what was negative about the situation. The analysis portion allows practitioners to consider "why" things went well or poorly in addition to giving writers a change to make 'sense' of the situation. In this way, it is similar to the reasoning portion of the 5R scaffold. Conclusions are then drawn about what was learned and what should have been done to create a more positive outcome. Finally, an action plan is made to develop skills and ensure that future situations do not follow the same pattern. The University of Edinburgh also provides helpful questions and examples to aid practitioners as they move through this scaffold.



3.6 Combined Model Recommended by Authors

The following is the scaffolding for reflection created by the authors of this Essay based on the works of Larrivee (Larrivee, 2000, 2005, 2008a, 2008b), Gibbs (Gibbs, 1988), Bain (Bain et al., 2002), and the University of Edinburgh (*Gibbs' Reflective Cycle*, 2020; *The 5R framework for reflection*, 2018). The following cycle summarize the approach:



Think of a situation

When beginning the process of reflection, it is helpful to first identify a particular situation on which to reflect. For example,

- Think of a situation when you felt uncomfortable, unprepared, unqualified, or regretful.
- Think of a time where you felt dissatisfied, particularly with the outcome of your actions or with the effects of your words.
- Recall situations that took you by surprise or simply made you pause to think in the moment.

What's the situation?

Describe the situation focusing on the facts of what occurred and what was said; feelings will be described in the next step.

Questions to consider include:

When and where did the situation occur?

Who was present?

Example:

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?

Now that you have described the facts of the situation, recall your feelings and thoughts that you had during the experience. Also try to incorporate the feelings of others involved as well as the impact this may have had on them.

Questions to consider include:

How did you feel before, during, and after the situation?
What were you thinking during the situation?
What do you think the other participants felt before, during, and after the situation?

Example:

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 them feel embarrassed or like they were 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 them 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 all together. 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?

Compare the described situation to a previous experience that you've had. If no such prior experience exists, then simply type "N/A" in the text box below.

Questions to consider include: Have you seen or experienced something similar before, perhaps in a different context? If so, what was similar or different between this other situation and the one you have described during this exercise?

Example:

Weirdly, this is similar as to when I was working with a post-doc I hired a few years ago. They were international and had missed a deadline for filing for their Visa,

and when they 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 their 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. They were 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?

Explore why certain aspects went well while others did not. Consider whether you had the adequate knowledge and skills to handle the situation. Finally, consider what someone who has experience with this type of situation would have done.

Questions to consider include:

Why did things go well or poorly?

Did you feel equipped to handle the situation (at the time you experienced it)?

How would have someone with experience in this type of situation handled things?

Example:

When speaking with my student, it was good that they 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?

Consider what you learned through this experience, particularly how you would react to similar situations in the future. Plan how you will develop the skills and/or knowledge you need to better handle future, similar situations.

Questions to consider include:

What did I learn from this situation?
What skills or knowledge, if any, do I need to develop? How will I do this?
How would I respond to similar situations in the future?

Example:

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 part way through the semester, rather than just the end of course evaluations, to try and catch gaps in understanding like what occurred with this student.

4. Analysis of Reflective Practice

Once practitioners have begun to adopt reflective practices, it becomes useful to monitor their developing ability to reflect. For individual educators, adhering to one of the scaffolds and ensuring that all aspects are met is extremely helpful. More complex tools have been developed for use by practitioner/observer pairs and are described below.

4.1. Larrivee's Questionnaire

Larrivee's work with reflective practice is evident in the development of a tool to measure the level of reflectivity of teachers (Larrivee, 2008a). Larrivee and coworkers reached out to many experts in reflective teaching practices; they sent out a compilation of observable behaviors, teacher beliefs, and teachers' thought processes for each expert to categorize into pre-, surface, pedagogical, or critical reflection. These indicators and their corresponding frequencies of occurrence are used to help categorize a teacher. Larrivee's tool is designed to be used by both

the practitioner themselves and a third party observer/interviewer. This was done in order to use mediation to help teachers develop professionally and progress to a higher, critical order of reflection. The initial purpose of the designed survey was to "provide a more concrete process for assessing how a prospective or practicing teacher is developing as a reflective practitioner and can serve as a tool for creating explicit structures to mediate higher order reflection. With strategic scaffolding developing teachers can be helped to reflect on, and modify, their teaching practices to address classroom concerns" (Larrivee, 2008a). However, the utility of Larrivee's survey tool extends to educational research as well. A modified version of the survey can be used based on teacher interviews to determine the progression of teachers towards critical reflectors as a result of various circumstances, providing researcher with a tool to measure an otherwise abstract characteristic.

4.2. Observation Tools

An additional tool that is useful, both in a research setting and informally between colleagues, is the RIOT (Real-time Instructor Observation Tool) which was first developed by West and coworkers (West et al., 2013). RIOT was specifically designed for physics courses using the Collaborative Learning through Active Sense-making in Physics (CLASP) course design method. It is a readily available online tool which tracks teacher behaviors and the time spent on different activities (such as passively observing, out of room, actively observing, student presentation, explaining, and engagement in dialogue) while also categorizing the interactions based on their audience (i.e. the whole class, small groups, individuals). West et al. mention that their tool is specific for physics classrooms implementing CLASP; however, RIOT's ease of use and invaluable feedback mean that modifications to RIOT in order to enable utilization of the tool in different contexts would be worthwhile. An example of how RIOT can

impact teaching practices via reflection is outlined by Paul and West (2018). In their paper, a vignette concerning two fictional instructors is described, and the analysis and utilization of the data for reflection is demonstrated. In particular, this is an example of two colleagues using RIOT as an informal tool to better their teaching practices. After looking at the data, each teacher reflects on their actual behaviors compared to their ideal course description and discusses methods to improve their teaching during an informal peer-mediation session between the two colleagues.

A similar observation protocol with a larger emphasis on students' behaviors and engagement is the Student Participation Observation Tool (SPOT) developed by Theisen, Paul, and Roseler (2022). This tool has been tested in multiple STEM disciplines. Theisen, Paul, and Roseler emphasize that SPOT was created to provide data and that it does not classify professors or imply any judgement about their teaching methods. Rather it is intended to provide data whereby teachers are able to evaluate their own performance, personally reflect on their implemented methods versus their ideal course environment, and then alter or sustain their strategies accordingly (Theisen et al., 2022). What separates SPOT as well as Paul's and West's interpretation of RIOT from other available course observation tools, such as Practical Observation Rubric to Assess Active Learning (PORTAAL) (Eddy et al., 2015) and the Classroom Observation Protocol for Undergraduate STEM (COPUS) (Lund et al., 2015; Smith et al., 2013), is the intended use. RIOT and SPOT have been investigated as tool for reflection by teachers, wherein the teachers themselves review the data concerning their courses and interpret whether their actions align well with the way they want to be teaching. This is similar to Larrivee's tool that the thought process and thinking of the teachers plays an important role in its implementation (Larrivee, 2008a). Conversely, protocols such as COPUS and PORTAAL,often

used by education researchers to monitor impact of instructional reform, have not yet being investigated as tool to promote and guide reflections. However, these assessment tools can be leveraged by practitioners as a method of fostering reflective practice. One such example was outlined by Reisner et al. (2020); they created a guide for how teachers can understand and utilize COPUS results to reflect on their current teaching practices and subsequently alter their teaching methods.

4.3. Minott

Minott (2008) modified Valli's typology of reflection in order to develop a reliable tool for the analysis of reflective journals. Specifically, the categories used by Minott were Valli's reflection-in-action and reflection-on-action (which Valli derived from Schön), deliberative reflection, personalistic reflection, and critical reflection. These are defined as follows: reflection-in-action and reflection-on-action indicate contemplation of the teacher's experiences, beliefs and values, and environment. This type of reflection is also described as concerning an individual's own, personal situation and was the most commonly overserved type of reflection by Minott. Deliberative reflection "emphasizes decision making based on teachers' personal beliefs, values, research, experience and the advice of other teachers" (Minott, 2008, p. 56). In this, an overlap is already seen with the prior level of reflection, as Minott is also quoted as saying "[reflection-in-action and reflection-on-action] also includes using one's own values, beliefs, classroom context, and students as sources of knowledge for action" (Minott, 2008, p. 56). This may be due to Minott combining the categories of reflection-in-action and reflection-on-action with that of personalistic reflection. The last category, critical reflection, is consistent with other literature in that it again goes back to considering ethical, moral, and political impacts of teaching and learning (Minott, 2008). It is worth noting that during the analysis of reflective

journals, Minott did not observe any that had evidence of technical reflection, and for this reason, this category was omitted from the cited paper. However, if others are to follow in Minott's methodology, it would be worthwhile to also consider this category in addition to clearly delineating between the different levels. Minott's methodology utilizes these categories to understand and characterize practitioners' reflections. In doing so, the relative level of depth and different contents can be compared to other practitioners. These same categories can be used in the self-analysis of reflective writings.

5. Further comments on terminology

Reflective educators may move past practices and turn to reading the literature in order to further their personal goals. Section 3 of the Essay is a useful starting point for understanding the terminology present in the literature. The timing-dependent models of reflection are relatively easy to conceptualize with intuitive naming-devices. However, there is not a consistent conceptualization of the depth-based models between education researchers, and the content-based characterizations are often grouped in with the depth-based models. In order to assist educators in navigating this literature, we provide below each of these models with more depth and relevant citations.

5.1. Depth-based models

Larrivee was somewhat unique in her incorporation of a pre-reflection classification for educators. However, her later categories are similar to what is described elsewhere in the literature, including the foundational work of van Manen in 1977 (van Manen, 1977). After Larrivee's pre-reflection category come that of surface reflection. Many have described this level of reflection as technical reflection (Day, 1993; Farrell, 2003; Schön, 1983), with Larrivee applying the term surface reflection as it depicts "a broader scope than technical concerns while connoting that values, beliefs, and assumptions that lie 'beneath the surface' are not being considered at this level of reflection" (Larrivee, 2008a). Surface reflection is therefore also indicative of a common misconception resulting from the prior knowledge (i.e. reflections in mirrors) which can influence practitioners. In van Manen's view, this level of reflection is concerned with achieving a specific goal, such as the students passing a course. However, practitioners only do this by conforming to the well-established norms which the majority of educators believe to be sufficient (van Manen, 1977).

Larrivee's definition for the middle level of depth-based reflections is simply termed pedagogical reflection. It is purposefully broad and uses simplified terminology as this level of reflection is perhaps the least consistent between researchers, and it encompasses a range of labels in the literature which differ slightly in terms of the necessary components (Larrivee, 2008a). Two examples of similar definitions, which have substantial overlap, are those given by Zeichner and Liston (1987) and Jay and Johnson (2002). Zeichner and Liston described the second level of reflectivity as concerned with revealing and evaluating both assumptions and preconceptions about teaching which influence educators' actions while also considering the resulting consequences, both positive and negative, of said actions. This is a definition which was derived from the work of van Manen and includes historical and institutional factors which can dictate educators' actions as well an educators' own previous experiences (Zeichner & Liston, 1987). Jay and Johnson (2002) call this second hierarchical level 'comparative reflection' and define it as the act of reframing a particular situation in such a way as to deliberately consider alternative perspectives and research findings which either did not occur to the practitioner or may be foreign to them. Many more examples of slightly divergent second levels of reflection are present in the literature. This level of reflective practice is one in which practitioners are still making practical choices, but there is also an emphasis on concomitant analysis of cultural and individual backgrounds as well as different preconceptions and assumptions that may impact the ensuing action (van Manen, 1977).

Though it may be described by many names, the third, and highest, level of depth-based reflections consistently involves a consideration of the moral or ethical consequences of a teacher's lessons. Larrivee (2008a)is one of the many researchers who utilizes the term critical reflection. In this highest level of reflectivity, practitioners deliberate the "worth of knowledge"

as well as the “social conditions necessary for raising the question of worthwhileness in the first place” (van Manen, 1977).

5.2. Valli’s content-based model

The depth-based models are often described as hierarchical models as there is a progression from one type of reflection to another, with critical reflection being the end goal. Interestingly, Valli’s typology has been characterized as being hierarchical in nature in such a way as to either support or contradict other authors’ published order of importance (Smith & Hatton, 1995). On the surface, this would be supported by the ease in which Valli’s different levels can be encompassed by different depth-based categorization models. In fact, Larrivee explicitly categorizes some of Valli’s levels within her own pre-reflection, surface reflection, pedagogical reflection, and critical reflection model (Larrivee, 2008a). However, as explained further in section 3 of the Essay, Valli’s initial description has the different categories of reflection being complementary rather than hierarchical.

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