

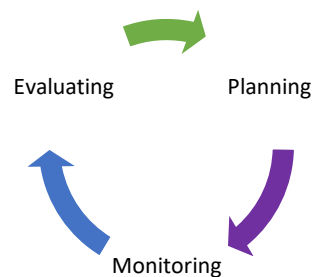
Metacognitive Self-Reflection Teacher Workshop

Group 1 Handout*

Reflection & the Metacognitive Cycle

You may want to plan metacognitive self-reflection exercises for students based on the metacognitive cycle, which includes the following phases:

- planning
- monitoring
- evaluating



The following three sections give examples for student self-reflection exercises based on each of these phases in turn.

“Planning” Exercises[†]

In the planning stage, students think ahead to upcoming assignments and identify what tools, skills, knowledge, and resources they already have and what they will still need to acquire in order to get the work done. They also set goals for the tasks and develop strategies for achieving those goals.

...

[Example] Strategy: Pre-writing. As you begin a new project (or exam, unit, essay, etc.), ask students to examine the prompt and write a reflection that does some or all of the following:

- Paraphrases what the project is calling for them to do in terms of the “big picture”
- Identifies (in their own words) the individual pieces, or tasks, or processes that will need to happen for them to successfully complete the project

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[†] This section of the handout is an excerpt from “Metacognition –Cultivating Reflection to Help Students Become Self-Directed Learners.” *Sweetland Center for Writing at the University of Michigan Website.* <https://lsa.umich.edu/content/dam/sweetland-assets/sweetland-documents/teachingresources/CultivatingReflectionandMetacognition/Metacognition.pdf>

- Identifies areas of the prompt that require clarification
- Identifies and articulates their role as the author/architect of this project (Who are they in the big picture? To whom are they speaking? For what purpose?)
- Considers the purpose of the assignment—what is its role in the course, but also how might it help them in the future?
- Lists or sketches out what they will need to know and/or know how to do in order to complete the project
- Lists or sketches out what they already know/know how to do in relation to the assignment
- Lists or sketches out what they will need to learn (a research question to pursue, a skill they need to develop, a tool they need to figure out how to use, etc.)
- Lays out a plan of action (the more specific it can be, the better ... including self-imposed deadlines for “deliverables”)

Because research has shown that reflection is often effective when it's social, it would be nice to give students time in class to break into pairs or small groups so they can share the results of their pre-writing exercise and discuss their reactions to the prompt. Furthermore, if you read these pre-writes quickly and respond to their questions for clarification as soon as possible, you can help students identify strategies they might need to reconsider before they begin, or course-correct misunderstandings about the project. You might want to look for common questions that you can clarify in the classroom, and then respond to any that need individual attention either in writing or via conference.

“Monitoring” Exercises

In this stage, teachers would encourage students check in with you (and/or themselves) *during* the process of working or studying. Some refer to this as “reflection-in-action” ([Sweetland Center website](#)). These reflections may even lead to adjustments to students working strategies, or they may reinforce what's working well for them.

Research Process

Sample free writing prompt:

Now that we are moving into or are immersed in the data analysis phase, you have already learned a lot about your research topic, but many of your questions will be still unanswered.

You may find it useful to reflect on how much you and your group have learned so far, in addition to clearly identifying what you still don't 'know'. Write for 5 minutes each (set a timer if it helps) on the following two points:

a. What's one thing you have already learned? How did you find it out? (AND/OR How do you “know that you know”?)

b. What's one question you don't yet have a clear the answer to? How will you continue to seek an answer?

Interpreting and Incorporating Feedback

Sample free writing prompt:

At this point in your studies and in this course, you've received much feedback from teachers, from your supervisor, and from your peers. At best, it challenges us to improve and rethink our positions. Yet, sometimes feedback can be overwhelming or otherwise a challenge to process and respond to.

Free write for 10 minutes about your reaction to the feedback you've received in this course AND/OR in general during your studies. You may want to write about:

- agreeing or disagreeing with the comments/feedback,
- your emotional response to critique, or
- how difficult or easy it is for you to incorporate or respond to feedback.

"Evaluating" Exercises

After a project or task is completed, you may want to ask students to reflect on their experience as a whole. What did they learn or achieve? What strategies or techniques did they use and how well did they serve them? This could also be an opportunity to reflect on what did not work as well or what they would have changed were they to start the task from the beginning again.

These could be considered 'evaluating' exercises or 'reflection-on-action' ([Sweetland Center website](#)). ‡

[Example] Strategy: Articulate Transferable Skills. Have students write a reflection in which they discuss a skill that the project helped them develop and ask them to imagine how the next writing experience could be made easier, more effective, or more efficient based on this writing experience. You might also ask them to imagine how they would solve problems in other writing scenarios or classes, such as other fields or professional work. For example, if they struggled with creating a cohesive narrative in a personal essay and used storyboarding to visualize what they were trying to do, how might they use that same skill in, say, a marketing course or in a job as a geologist?

[Example] Strategy: Project Post-Write. A post-write can be an effective way of getting students to think carefully about their process, the product, and the assessment of that product. After you've handed back a graded project with your feedback, invite students to consider how well their planning and/or monitoring strategies worked, and why they earned the particular grade (or other form of assessment) ...

Some questions you may want to have students consider are:

‡ The examples in this section of the handout are excerpts from "Metacognition –Cultivating Reflection to Help Students Become Self-Directed Learners." *Sweetland Center for Writing at the University of Michigan Website*. <https://lsa.umich.edu/content/dam/sweetland-assets/sweetland-documents/teachingresources/CultivatingReflectionandMetacognition/Metacognition.pdf>

Group 1 Handout

• How much time did you spend on this project? How was that time organized? For instance, about how much time did you spend on each of the following (the individual tasks will vary from project to project):

- | | |
|---|--|
| <input type="checkbox"/> Creating a plan of action | <input type="checkbox"/> Visiting the Writing Center |
| <input type="checkbox"/> Research | <input type="checkbox"/> Learning a new tool |
| <input type="checkbox"/> Reviewing course notes | <input type="checkbox"/> Pre-writing |
| <input type="checkbox"/> Talking with your peers | <input type="checkbox"/> Drafting |
| <input type="checkbox"/> Talking with your instructor | <input type="checkbox"/> Revising |

• Given the time you spent on various aspects of the project, and the feedback you received, what would you do differently if you were to do it over? Why? What would you do the same? Why?

• Looking at the feedback you received on your project, what strategies proved most effective for you, and how? What strategies didn't work, and why? Based on your answers to these questions, what could you do differently next time to increase your chances of success?

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Group 2 Handout*

Encouraging Authentic Reflection

This handout focuses on ways to encourage and train students in the skills of authentic self-reflection. It introduces:

- Social reflection or peer modeling
- Scaffolding reflection
- Creative forms of reflection

Social reflection or peer modeling

Self-reflection may be more accessible when students have examples of other students' ways of studying or working. They may learn new strategies or techniques, and they also may learn that they share these with other students.

Similarly, exchange can help students feel less alone in their struggles if they learn that other students face related challenges. As Lin (2001) writes:

Knowledge about the self-as-learner is usually developed using social modeling provided by other people. Social models are an important source for conveying cognitive skills and for building knowledge about the self-as-learner. For instance, a student might observe a peer or a teacher engage in effective problem identification and conceptualization of principles for problem solving. By observing their social peers, students may begin to think that they also can be creative and effective problem solvers. (Lin 2001, p. 27-28)[†]

Discussion Question: How could you incorporate a social element into the metacognitive self-reflection activities with which you are already familiar?

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[†] Lin, Xiaodong (2001) Designing Metacognitive Activities *Educational Technology Research and Development* 49.2: 23-40.

Scaffolding or 'Strategy Training'‡

Incorporating activities throughout the semester, in response to real issues, problems, or topics will help build metacognitive skills and avoid superficial reflection. Giving feedback or responding to self-reflections and metacognitive practices

Explicitly teaching metacognitive strategies

The table on the next page of this handout:

provides examples of self-questions that metacognitive undergraduate biology learners might ask in the process of planning, monitoring, and evaluating their learning in the context of a single class session, a homework assignment, an exam, or an entire course. While this collection of questions by no means represents the entire landscape of what metacognition could involve, it does provide starting points for faculty who wish to talk with students explicitly about metacognitive strategies. These questions can be shared directly with students and/or embedded into particular assignments. (Tanner 2012, p. 114-115)

Discussion Question: How might these questions (or similar questions) be incorporated into your courses or course activities to help scaffold these skills for your students?

‡ Tanner, Kimberley D. (2012) Promoting Student Metacognition *CBE-Life Science Education*. 11:113–120.

Excerpt of Table “Sample Self Questions to Promote Student Metacognition About Learning” (Tanner, 2012)

Activity	Planning	Monitoring	Evaluating
Class session	<ul style="list-style-type: none"> ▪ What are the goals of the class session going to be? ▪ What do I already know about this topic? ▪ How could I best prepare for the session? ▪ Where should I sit and what should I be doing (or not doing) to best support my learning during class? ▪ What questions do I already have about this topic that I want to find out more about? 	<ul style="list-style-type: none"> ▪ What insights am I having as I experience this class session? What confusions? ▪ What questions are arising for me during the class session? Am I writing them down somewhere? ▪ Do I find this interesting? Why or why not? How could I make this material personally relevant? ▪ Can I distinguish important information from details? If not, how will I figure this out? 	<ul style="list-style-type: none"> ▪ What was today’s class session about? ▪ What did I hear today that is in conflict with my prior understanding? ▪ How did the ideas of today’s class session relate to previous class sessions? ▪ What do I need to actively go and do now to get my confusions clarified? ▪ What did I find most interesting about class today?
Quiz or Exam	<ul style="list-style-type: none"> ▪ What strategies will I use to study (e.g. study groups, problem sets, evaluating text figures, challenging myself with practice quizzes, and/or going to office hours and review sessions)? ▪ How much time do I plan on studying? Over what period of time and for how long each time I sit down do I need to study? ▪ Which aspects of the course material should I spend more or less time on, based on my current understanding? 	<ul style="list-style-type: none"> ▪ To what extent am I being systematic in my studying of all the material for the exam? ▪ To what extent am I taking advantage of all the learning supports available to me? ▪ Am I struggling with me motivation to study? If so, do I remember why I am taking this course? ▪ Which of my confusions have I clarified? How was I able to get them clarified? ▪ Which confusions remain and how am I going to get them clarified? 	<ul style="list-style-type: none"> ▪ What about my exam preparation worked well that I should remember to do next time? ▪ What did not work so well that I should not do next time or that I should change? ▪ What questions did I not answer correctly? Why? How did my answer compare with the suggested correct answer? ▪ What questions did I not answer correctly? Why? What confusions do I have that I still need to clarify?

Creative Forms of Self-Reflection[§]

As academics, we are often partial to texts, but by allowing for flexibility and diversity in the form of reflection, we may encourage students to play to their strengths and capabilities. Take a quick look at some of the possibilities suggested by Harvey et al (2016):

Music

“Music can also play a role in reflection by helping to bypass blocks and create a more ‘intuitive, creative’ connection to an experience, as demonstrated by the following reflection:”

In spite of working in a field (Philosophy) that is dominated by words, I find reflecting by writing both difficult and unsatisfying. My experience of reflecting through composing and playing music is in stark contrast to this – I feel that the rhythms, notes, tempos and structure of my compositions allows me to connect to what I felt during an experience, as well as to how I process it (Michaela Baker, academic, 2015). (Harvey et al. 2016, p. 8)

Storytelling

The telling and hearing of stories can assist students in thinking differently about the complex and dynamic events, concepts and knowledge they encounter, and to question ways of knowing, being and doing in the world.... With this in mind, storytelling can help students engaged in reflective practice to challenge their assumptions and make sense of their experience. (Harvey et al. 2016:9)

Discussion Question: Would you be able to allow for creative forms of self-reflection in your course? Why or why not?

[§] Harvey, Marina et al (2016) A song and a dance: Being inclusive and creative in practicing and documenting reflection for learning. *Journal of University Teaching and Learning Practice*. 13(2): 3.

Metacognitive Self-Reflection Teacher Workshop

Group 3 Handout*

Promoting a Metacognitive Environment

In addition to training students specifically to build their metacognitive skills and allowing social and responsive ways to self-reflect, there are other techniques you can employ to promote an environment to support authentic metacognitive self-reflection. This handout will cover:

- Culture of metacognitive self-reflection through classroom activities
- Faculty metacognitive self-reflection

Classroom Assessment Tools (CATs)[†]

There are many short activities you can do during class time that will help promote metacognitive thinking in your students... They often take a few minutes to do and are easy to implement.

CATs give students and faculty immediate feedback on learning.

Assessment Method	Description	How To Use
One Minute Paper	During the last few minutes of class, students write response to "Most important thing I learned today" and "What I understood the least today".	Review/read all before next class and use to clarify, correct or elaborate more for students.
Muddiest Point	Similar to One-Minute Paper – but only ask students to describe what they didn't understand during class and what they think might help them.	Same as One-Minute Paper but if many students have same problem, reteach concept another way.

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[†] Excerpt from: Center for Innovation and Excellence in Learning Website. "Ten Metacognitive Teaching Strategies." Link: <https://ciel.viu.ca/teaching-learning-pedagogy/designing-your-course/how-learning-works/ten-metacognitive-teaching-strategies>

Student-Generated Test Questions	Divide the class into groups and assign each group a topic on which they are to each write a question and answer for next test.	Use as many of the questions as possible on next test.
K-W-L Chart	Label three charts K (What I KNOW Already), W (What I WANT to Know) and L (What I have LEARNED). Complete the first two before a unit/topic and the last one at end.	Discuss with students their perceptions of what they thought they knew, what they have come to know etc.
Think-Pair-Share	Give the class a question. Allow everyone to think on own for a few minutes jotting down some thoughts. Then ask students to pair up with a peer and discuss thoughts for another few minutes. Can do groups of 4 as well. Ask to share with whole class.	Use when you want to have a better discussion by a greater number of students. By thinking alone first and with small groups of peers, shared responses should be richer and more varied.
Application Cards	After teaching a theory, principle or procedure, ask students to write down at least one real-world application for what they have just learned to determine if they can see the transfer of their recent learning.	Quickly read through once and categorize them according to quality. Pick out a broad range of examples to share with the class the next day.
Classroom Opinion Polls	Using 'clickers', or online polling questions, ask students a variety of questions about a topic and seek their anonymous opinion,	Often polling devices can present immediate results back to the class to provide discussion and next steps.
Weekly Report	Written by students each week in which they address three questions: What did I learn this week? What questions remain unclear? And What questions would you ask your students if you were the instructor to find out if they understood the material?	Read at end of each week, categorize responses and share with class. Follow up on unclear questions with class or small group of students.
ConceptTests	Instructor presents one or more questions during class involving key concepts, along with several possible answers (multiple choice). Students indicate (by show of hands, or poll/clicker voting) which answer they think is correct. If most of the class has not identified correct answer, students are given a short time to persuade their neighbor(s) that their answer is correct. The question is asked a second time to gauge class mastery.	Often lasts a few minutes but uncovers misunderstandings, and great conversation amongst students. Share answer after second voting session to see how the class responses changed or didn't change.

Faculty Metacognition[‡]

We can model metacognition for our students by being reflective about our own teaching and research practices. Teachers can also use self-reflection as a way to analyze and transform our teaching. Tanner (2012) writes:

While instructors no doubt bring a deeply metacognitive approach to their field of scientific research, cultivating a metacognitive lens toward one’s teaching does not appear to automatically or easily transfer. However, developing a metacognitive stance toward one’s own teaching—thinking about how you think about teaching—can be a wonderfully natural entry point into iteratively changing one’s own teaching practice. (Tanner, 2012, p. 118)

Table: Sample self-questions to promote faculty metacognition about teaching (Excerpt from Tanner, 2012, p. 119)

Activity	Planning	Monitoring	Evaluating
Class session	<ul style="list-style-type: none"> ▪ What are my goals for this class session? How did I arrive at these goals? ▪ What do I think students already know about this topic? What evidence do I have for my thinking? ▪ How could I make this material personally relevant for my students? Why do I think this? ▪ What mistakes did I make last time I taught this and how can I not repeat these? 	<ul style="list-style-type: none"> ▪ What do I notice about how students are behaving during this class session? Why do I think this is happening? ▪ What language or active-learning strategies am I using that appear to be facilitating learning? Impeding learning? ▪ How is the pace of the class going? What could I do right to improve the class session? 	<ul style="list-style-type: none"> ▪ How do I think today’s class session went? Why do I think that? What evidence do I have? ▪ How did the ideas of today’s class session relate to previous class sessions? To what extent do I think students saw those connections? ▪ How will what I think about how today’s class session went influence by preparations for next time?
Overall course	<ul style="list-style-type: none"> ▪ Why do I think it’s important for students pursuing a variety of careers to learn the ideas in my course? What are my assumptions ▪ How does success in this course relate to my students’ career goals? How might I reveal these connections to them? ▪ What do I want students to be able to do by the end of this course? Still be able to do 5 years later? 	<ul style="list-style-type: none"> ▪ In what ways am I effectively reaching my goals for students through my teaching? How could I expand on these successful strategies? ▪ In what ways is my approach to teaching in this course not helping students learn? How could I change my teaching strategies to address this? ▪ How is my approach to teaching this course different from the last time I taught it? Why? 	<ul style="list-style-type: none"> ▪ What evidence do I have that students in my course learned what I think they learned? ▪ What advice would I give to students next year about how to learn the most in this course? ▪ If I were to teach this course again, how would I change it? Why? What might keep me from making those changes?

[‡] Excerpt and table from Tanner, Kimberley D. (2012) Promoting Student Metacognition. *CBE-Life Science Education*. 11:113–120.