Critical Thinking in Psychology (& Life) Workshop Series: Instructional Materials

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Introduction: Context and Purpose

The development of critical thinking skills and habits is one of the most important features of an undergraduate education, and the American Psychological Association (APA) includes critical thinking as one of the five major learning goals of the undergraduate psychology major (APA, 2013). However, despite widespread agreement regarding its importance, it has also been observed that critical thinking is rarely explicitly taught to psychology students (e.g., Sternberg, Roediger, & Halpern, 2007). In an attempt to remedy this void, we recently designed and piloted a series of critical thinking workshops within our department.

There are many published resources on critical thinking (e.g., Halpern, 2014) that were referenced during the development of these workshops. Most existing resources are quite dense and designed to be an entire course in and of themselves. Less dense resources are often only available behind paywalls (e.g., Paul & Elder, 2006). The purpose of this resource is to offer instructors a brief, effective, and freely available guide that will help them incorporate lessons on critical thinking into their classes or allow them to run their own critical thinking workshop(s).

At present, this resource provides detailed information regarding the first workshop in the series "Setting the Stage: An Introduction to Good Thinking". The resource includes learning objectives, lessons and activities, and assessment strategies. We believe that this workshop is the most important in the series, as it introduces students to the notion of actively open-minded thinking (Baron, 1996) and emphasizes the notion that critical thinking involves habits, skills, and mindsets that can be continually improved with practice. Students are led through a series of exercises that challenge their assumptions and increase awareness of their own thinking styles and habits, allowing them to identify specific areas in which they need improvement and providing them with the motivation for engaging in such thought.

We have now run this particular workshop three times (twice in the Fall of 2016, and once in Fall 2017), and feedback from students ($N = 165$) has been consistently positive. For example, after attending the workshop:
- 88% of students indicate that they will be able to continue developing the skills learned in this workshop
- 82% agree that the workshop will be useful for their courses
- 81% agree that the workshop will be useful for their life (outside of courses)

The remaining workshops in the series are still "under construction", but it is our hope to be able to add them to this resource as soon as they are ready to be shared.

Instructors who wish to know more about the other workshops and/or our ongoing assessment strategies are encouraged to contact Ashley Waggoner Denton (waggonerdenton@psych.utoronto.ca).

Setting the Stage: An Introduction to Good Thinking

General Overview

The goal of this workshop is to introduce students to the practice of actively open-minded thinking and increase their motivation for engaging in such thought (in both the classroom and beyond). Emphasis is placed on the notion that critical thinking involves habits, skills, and mindsets that can be continually improved with practice. Students will be led through a series of exercises that will challenge their assumptions and increase awareness of their own thinking styles and habits, allowing them to identify specific areas where they need improvement. While it is possible for instructors to follow this guide 'as is' and complete all of the exercises, demonstrations, etc., within the context of a workshop (or similar) setting, we fully recognize that time (and other) constraints may prevent most instructors from doing so. Therefore, we also strongly encourage a 'pick and choose strategy' whereby instructors select just one or two lessons and activities to incorporate into their teaching.

Learning Outcomes

By the end of this workshop, we expect that students will be able to:

1. Explain why critical thinking is important and worthwhile.
2. Describe some key critical thinking skills and habits.
    a. Identify specific habits/skills that they would most like to improve.
    b. Set intentions for developing these skills/habits.
3. Explain the difference between ability and willingness when it comes to critical thinking.
4. Describe why critical thinking can be difficult.
    a. Identify specific obstacles/barriers to their own good thinking habits.
    b. Identify potential strategies for overcoming these difficulties.

Assessment Strategies

While a number of activities included in the workshop may be examined for formative assessment purposes if desired (e.g., the mini-reflective essay described on page 11-12), the following is a list of some brief and freely available measures of critical thinking that instructors may also wish to utilize (e.g., in order to get pre-post assessments of their students critical thinking skills and tendencies).
- Actively Open-Minded Thinking Beliefs (e.g., Svedholm-Häkkinen & Lindeman, 2017)
- Objectivism Scale (Leary et al., 1986)
- Need for Cognition Scale (Cacioppo et al., 1984)
- Critical Thinking Disposition Self-Rating Form (Facione, 2013)

Full references and links (when possible) to these measures are listed at the end of the document (see References and Additional Resources).

Lessons & Activities

Opening Reflection/Pre-Assessment

If you wish to get a pre-workshop assessment of students' critical thinking tendencies, you may want to have them a complete a survey at the beginning of the workshop. In our case, the students had been invited to fill out an online survey before attending the workshop, so for those who had already completed the survey, we asked them to complete a free-writing reflection activity, with the following instructions and prompts:

Rules for free writing:
1) keep writing for the whole time,
2) don't censor,
3) don't overthink,
4) you are free to write absolute garbage,
5) you don't have to share.

If you have already completed the survey, please take this time to reflect:
- What do you think good thinking involves? (What habits, skills, mindsets)?
- Reflect on specific situations in your life when you have done these things. (What made it easier in these situations?)
- Reflect on specific situations in your life when you haven't done these things as well. (Why didn't you? What made it harder to do?)

In this way, either through the survey or free-writing activity, all students begin the workshop by taking 5-10 minutes to reflect on their own critical thinking practices.

Lesson 1: Why is critical thinking important?

Downsides of failing to think critically
We open the workshop by discussing the downsides of "bad" thinking, in order to highlight why *good* thinking is important.
- The main point is that bad thinking can lead to bad consequences.
- Potential examples of this that may be discussed include:
  - Historic groupthink-type cases (e.g., Challenger disaster, Bay of Pigs invasion, decision to invade Iraq)
  - More student-relevant examples (e.g., choosing courses, reading the news)
  - Health and medicine examples (e.g., relying on anecdotes, biased studies)
  - Current events (e.g., Brexit)
- From Facione (2013, p. 3): Failures of critical thinking contribute to: Patient deaths, lost revenue, ineffective law enforcement, job loss, gullible voters, garbled communications, imprisonment, combat casualties, upside down mortgages, vehicular homicide, bad decisions, unplanned pregnancies, financial mismanagement, heart disease, family violence, repeated suicide attempts, divorce, drug addiction, academic failure.

ACTIVITY: Ask students to share a time when their own lack of critical thinking led to negative consequences for them (or a friend/family member).

We also take time at the beginning of the workshop to emphasize that:
- Good thinking is NOT about whether you are "inherently smart"
- Good thinking involves habits, skills, and mindsets
  - We all have these to some extent
  - And they can be used more and improved, with practice and motivation!

Why is it important for students to learn critical thinking?
We highlight the following three points in the workshop, but of course there are many additional reasons that instructors may choose to add here:
- Your future careers will likely change a lot or don't even exist yet, so specific knowledge and skills you learn in university won't be as useful as general thinking skills.
- Information explosion/overload → not all information is correct, beneficial, or useful, so it's important to be able to effectively separate 'wheat from chaff'.
- Critical thinking about psychology in particular is important because psychology is important to life! (e.g. coping with stress, improving relationships, discerning motives)

ACTIVITY: Ask students to think about and share their own reasons/motivations for developing their critical thinking skills (e.g., if relevant, ask them what brought them to the workshop today, what are they hoping to get out of it?)

Lesson 2a: What is critical thinking?

ACTIVITY: Have students generate a list of good and bad thinking habits and create a table. An example is shown below:

Good habits	Bad habits
• Fair and open-minded when considering different views	• Biased to prefer own side
• Tries to understand things deeply, curious	• Only superficial understanding; does not care to learn more
• Questions assumptions, evidence, limitations	• Accepts without questioning
• Persistent, thorough, careful	• Jumps to conclusions
• Humility, recognize own limitations, admit when wrong or don't know	• Overly confident

After creating a suitable list, ask students to think of a (preferably recent) example of a time they exhibited a thinking habit from both the good side and bad side of the table (could do as a think-pair-share exercise). Explain that the point of this is that everyone has these skills and habits to some extent, but we don't always use them as well as we could. One of the most important aspects of becoming a better thinker is getting into the habit of applying these more often. Make

sure they understand that this workshop (or whatever the context) will help them better understand *what* these good thinking habits are, but it's *up to them* to keep practicing and applying these strategies.

Note: Especially if you haven't already, you can take a moment here to (re)emphasize that good thinking and bad thinking are not the same as being a "smart" or a "stupid" person (e.g., Einstein did poorly in school, but was an excellent critical thinker). It's about developing good habits and mindsets and it requires effort and practice!

Introducing the idea of actively open-minded thinking
The broad definition of critical thinking that we use throughout the workshops is Jonathan Baron's (1996) notion of ***actively open-minded thinking***:

"In good thinking:
  o search is sufficiently thorough for the question;
  o search and inference are fair to all possibilities under consideration [including ones other than our initial/preferred position]; and
  o confidence is appropriate to the amount of search that has been done and the quality of the inferences made." (Baron, 1996)

In other words, good thinking involves searching for alternative perspectives (other than your initial/preferred one), integrating across these, and making appropriate adjustments to your confidence level. Since this definition is somewhat abstract, it's important to break it down with examples that demonstrate some of the key ways in which people often diverge from good thinking (e.g., searching too little/too much, or being over/underconfident).
  o Can also ask students to provide their own examples (e.g., share a time when they were overconfident in some belief; have them reflect on possible reasons for the overconfidence).

Possible exercises to help students understand the parts of this definition:
  • Choose one of the examples of 'bad thinking' previously described by the instructor or the students, and walk through each component of this definition to show how it applies to this particular example:
    o E.g., One example of bad thinking may be having a family member who tends to believe everything she reads on Facebook (e.g., that Swiffers are poisoning pets and children) and then share it with others as though it were fact. In order to turn this into an example of 'good thinking' this person could do more thorough research on the issue by attempting to verify the information through unbiased channels (e.g., looking up the story on Snopes.com). Depending on the outcome of this search, she should then adjust her confidence appropriately, which would perhaps prevent her from sharing misinformation with others.
    o E.g., In the case of the Challenger explosion, you can discuss how people's biases (wanting to move forward with the launch) prevented them from being fair and open to all possibilities, and how the level of confidence was too high, given the quality of the search and inference completed (especially when balanced with the level of risk involved in the decision).

- It is important to point out that thinking of plausible alternatives often involves recognizing and questioning hidden assumptions. This notion of hidden assumptions is probably best illustrated with examples (instructors may wish to put up a picture of an advertisement, for example, and then ask students to identify the hidden assumption(s)).
  - E.g., Anything that is advertised as "100% Natural" (hidden assumption → that natural means the product is healthy/safe/beneficial/etc.)
  - E.g., "I want to major in psychology because I want to help people" (hidden assumptions → that majoring in psychology will lead to more helping-focused career options than other majors)
  - Additional resources for examining unstated assumptions:
    - http://www.csus.edu/indiv/d/dowdenb/60/implicit-assumptions.html
    - https://www.youtube.com/watch?v=JuXeVpaToPo
- ACTIVITY: Have the students walk through an example of a question they might type into Google (e.g., "is the paleo diet good for you?") and how they would go about answering the question. Can break them into groups and have them each decide on a question they want to answer. Possible discussion points:
  - How did they choose the exact phrasing/words to search? If Google auto-filled in suggestions as they were typing, did that affect their thinking at all?
  - How did they select which links to explore? Did they have a preferred stance on the issue before they googled it (and if so, how confident were they in this answer before their search)? What factors do they think played a role in their selection of information? (e.g., top hits, the source of the information, date of information, etc.)
  - How did they determine how much information was 'enough' to answer their question? What type of factors do they think help determine this threshold of 'enough' (this will inevitably bring up issues that will be discussed later in the workshop, e.g., time, energy, motivation).
  - How confident do they feel in their answer to this question?
- To emphasize the importance of holding beliefs with appropriate confidence, you may wish provide examples of overconfidence and have students point out what important information may have been missed or misevaluated.
  - Examples of (rather obvious) overconfidence:
    - A driver cuts in front of you and you yell "what a jerk!"
    - Get a tattoo of boy/girlfriend after 3 months of dating.
    - Do poorly on a test and decide "I'm stupid, I can never do well".
    - Someone claiming that "I don't eat genetically modified foods".
    - Someone uses a new treatment (e.g., Cold FX), gets better, and tells everyone to go use it.

Lesson 2b: Why is it important to distinguish between willingness and ability when it comes to critical thinking?

Highlighting the distinction between ability and willingness to think critically
As mentioned previously, it is important to point out that being an intelligent person does not protect someone from poor thinking habits. In the workshops, we briefly describe Keith

Stanovich's notion of dysrationalia and the distinction between intelligence and rationality (e.g., http://magazine.utoronto.ca/feature/why-people-are-irrational-kurt-kleiner/) .

In the workshops, we have used the following examples to help demonstrate to students how easy it can be to fall into some of the 'traps' of bad thinking:

Demonstration of insufficient search
Students are given the following problem:
- Jack is looking at Anne, but Anne is looking at George. Jack is married, but George is not. Is a married person looking at an unmarried person?
    - a. Yes
    - b. No
    - c. Cannot be determined.

Source: Stanovich, 2015, Scientific American (is also presented in the University of Toronto magazine link provided above)

The majority of the students will (incorrectly) choose C, rather than thinking through all of the possibilities and realizing that the answer is A, no matter what Anne's situation is
(i.e., J (married) → A (married) → G (unmarried) → yes!
    J (married) → A (unmarried) → G (unmarried) → also yes!)
In our experience, this demonstration is very successful at getting students to realize how easy it is to fall into miserly thinking and for them to reach a conclusion without actually thinking through all of the possibilities. (Note: In my experience, writing/sketching out the answer is sometimes necessary in order for everyone to recognize that the correct answer is indeed A!)

Demonstration of biased search
Wason's 2-4-6 Problem
- In this classic demonstration of the confirmation bias, students are given the following instructions "I am going to give you a series of numbers. This series conforms to a rule and you have to figure out what the rule is. The way to do this is by coming up with your own series of numbers. I will tell you whether your own series conforms to this rule or not. You can give me as many series of numbers as necessary to discover the rule. When you believe that you know the rule, tell it to me and I will let you know if you are right." (as described in Halpern, 2014, p. 406). Students are then given "2 4 6" as the series of numbers.
- Even if students don't take very long to reach to correct rule (which is "any series of increasing whole numbers"), they will almost inevitably test series of numbers that conform to whatever rule they have in mind, rather than trying to disconfirm it. This demonstration can be done by having a single student volunteer to complete the task in front of the group, but it also works by having students in a large group raise their hands to volunteer guesses one at a time. In either case, you will want to request that any students who are familiar with the problem refrain from participating!

Alternative exercises/demos:
- Stanovich's Scientific American article contains a number of other examples similar to these that could be used as alternatives (or in addition to these).

- Students could also be asked to complete the items from the Cognitive Reflection Test (Toplak, West, & Stanovich, 2001).

Lesson 3: Debate is essential to science and to good thinking in general

Good thinking is more than being "critical"
Note that although these workshops are called 'critical thinking', good thinking is actually just as much about being creative and constructive (generating new ideas) as it is about being 'critical' (evaluating or finding problems with existing ideas).
- Just like in science, or evolution, you need variation and selection to make progress.
- Setting up an internal debate, seeking out competing ideas, etc., are great habits of good thinkers.

Example of seeking out competing views/plausible alternatives
- VIDEO: TED Talk (Dare to Disagree) by Margaret Heffernan (https://www.ted.com/talks/margaret_heffernan_dare_to_disagree)
In the workshop, we show the first 6 or 7 minutes of this video, where Margaret Heffernan tells the compelling story of Dr. Alice Stewart (who discovered that x-rays during pregnancy were harmful to the fetus) and her unorthodox partnership with statistician George Kneale. The video goes on to discuss some of the problems with thinking within large organizations and highlights the importance of being open to multiple and diverse perspectives and of actively searching for alternatives. The video also emphasizes how conflict and disagreement are necessary for scientific progress.

Motivation for seeking out competing views/plausible alternatives
One issue with critical thinking is that people often act as if it means being critical of everyone else and not yourself (i.e., often we are biased to prefer our own viewpoint, and we aren't as fair to different points of view). One way to counteract this is to seek out and try to understand alternative viewpoints: For example, someone who is really into politics might try to read both left and right-wing newspapers, to understand both sides of a story. Even if your initial view is correct, there are good reasons to try to seek out and understand plausible competing views (you can ask the students to generate some reasons, such as):
- If your beliefs can withstand strong counterarguments, then you are even more justified in being confident in it.
- Often you are wrong, or only partly right, so considering both sides can help you come to a better viewpoint.
- Even if you are right, if you want to persuade other people, you have to understand how their view seems reasonable to them and not just dismiss their views.
- Also, even if you are right it might help you develop your ideas, and through the process of defending it you understand it better, develop it better, and make new connections.

ACTIVITY: In order to practice generating alternative views, students can complete this mini-reflective essay activity (from Baron, 1996). Within the context of the workshops, we always provide the students with an issue (the example below works well). But if you have the students do it as a homework activity, you might consider having them choose their own topics.

Issue: Should we remove marks at university?
- What is your initially preferred view?
- Construct the strongest, most plausible argument possible for an alternative/opposite view.
- Come up with a criticism or issue of that view that you consider most important.
- Come up with a rebuttal if possible.
- Evaluate how plausible each side is or come up with a new view that integrates what is good about both sides or overcomes the issues raised.

While you could always have students complete the task in small groups/pairs, we believe it is best for students to complete the initial thinking/writing on their own, so that they get practice generating arguments on all sides of the issues. However, coming together with others and being exposed to different arguments is also important and should be done after the initial individual work.

After discussion, have the students reflect on their thinking process:
- Was it difficult to construct a good argument for your non-preferred view? Did you notice any biases in yourself?
- Do you feel your thoughts on this issue changed or got better after going through this process? How/why (or why not?)
- During your discussion with others, did you find that it helped you create fair, strong arguments for both sides or not? Why/why not?

The Split-Mind Strategy
We teach students that one strategy to use (when reading articles, etc.) in order to keep a fair and open critical mind is to use a "split mind" approach:
- Half of you is actively agreeing, extending, applying, making connections, refuting criticisms.
- Half of you is actively disagreeing, questioning, thinking of counterexamples, problems.

ACTIVITY: Give students a brief passage to read, practicing the split mind idea. In the workshop, we provide a summary of Libet's free will experiments will from the 1980s (included below), but in the context of a class, any course-relevant material would be best. If time allows, you could even have students read an entire article (or break them into groups and assign each group a section).

Sample passage: Free Will is an Illusion
In Libet's experiments, a participant would be asked to perform a simple task such as pressing a button or flexing their wrist. Sitting in front of a timer, they were asked to note the moment at which they were consciously aware of the decision to move, while EEG electrodes attached to their head monitored their brain activity. Libet showed consistently that there was unconscious brain activity associated with the action - a change in EEG signals that Libet called "readiness potential" - for an average of half a second before the participants were aware of the decision to move. In other words, your brain appears to decide to move before any conscious intention to do so, suggesting that the conscious decision "I choose to move" is more of an afterthought than the causal determining force during a simple motor task.

Note:
- Instead of providing the passage, you could show this brief video clip:
  https://www.youtube.com/watch?v=OjCt-L0Ph5o (stopping around the 1 minute mark, before it goes into the different interpretations of these findings)
- For a summary of critiques of Libet's experiments, see:
  https://www.psychologytoday.com/blog/out-the-darkness/201709/benjamin-libet-and-the-denial-free-will

Whether you choose an entire article, video clip, etc., make sure to give students time to practice the split mind strategy and then to discuss and reflect on their experience.
You may then wish to follow-up with an example that involves an issue where students may have strong preconceptions (e.g., research on gun control:
http://www.guncite.com/gun_control_gcdgaga.html).

Lesson 4: Why can good thinking be difficult?

We focus on two big reasons that are geared toward students with little to no psychology background (i.e., first year students): Limited time/energy/resources and motivated reasoning. In the context of a course, we would certainly suggest tailoring these obstacles to the specific content and level of the class (e.g., focusing on specific judgmental or statistical heuristics and biases, or cognitive dissonance and rationalization, etc.)

1. Limited time/energy/brainpower → *Of course, it's not possible to consider all possible alternatives all of the time!*

Ask students to think about this for a moment and to suggest possible strategies to help with this or reduce potential problems with it.

Strategies that may help with this:
- Start with an initial assumption that most things are possibly true, possibly false, and most likely somewhere in the middle.
  - For example, most of the 'information' you will learn in your courses are not facts, but arguments – and they will be updated, subjected to new interpretations and nuances (e.g., the fundamental attribution error only really applies in western cultures, even though it's called 'fundamental'). The same applies in life, politics, relationships, your own opinions, etc. By defaulting to a mid-level of confidence, then even if you don't put in the thinking time/resources, you will be open to other alternatives (while at the same time, not rejecting everything outright).
  - E.g., If you have done the "Google" exercise earlier (Lesson 2), you can go back to this and have students think about their initial position and confidence level, how much time they were able to devote to researching it, and what their appropriate level of confidence should be.
- Note: this is where practicing the split-mind strategy and turning it into a habit (so that it becomes less effortful and time-consuming) can be really beneficial!

- When should you put extra effort into good thinking?
  - When it is important - for example, when you appear to be "stuck" in a not-so-great situation (e.g., you keep having arguments with someone over the same issue) or getting stuck in your own habits of thinking/action (e.g., you keep procrastinating on assignments and being stressed near the deadline). In these cases, you want to try to get a deeper understanding of what is going on (fairly consider all plausible alternatives, even ones that might be unflattering to you; examine assumptions you've been making), so that you can attempt to address the issue/solve the problem.
  - When you want to become more engaged and/or knowledgeable in something. For example, your courses can be a lot more fun when you try to question the material or make new connections, etc., rather than being a passive, uncritical receiver of information. Or sometimes you just want to understand something better because you find it interesting and enjoy discussing it with people.
  - Note: Some students may struggle more with the problem of *overthinking unimportant* things, in which case it may be fruitful to focus more of the discussion on how to prioritize one's thinking.

- Sometimes issues are really complex – e.g., how to solve global warming – and it's still hard to find the right way to think about something even if you try. But at least by trying we get closer to a good solution than if we don't try at all.
- And it's okay to not think a lot about everything. Just remember that it's always important to have <u>appropriate confidence</u>. If you haven't thought about it or gathered information on it, admit that you don't know!

2. Biased Motivation ➔ *Sometimes we are motivated to believe certain things!*

Again, can ask students to think about this for a moment and to suggest possible strategies to help with this or reduce potential problems with it.

Examples:
- We want to think of ourselves positively, so when something goes against that – e.g., you do poorly on a test – it can be threatening and blind us to good thinking. To avoid feeling bad, we might just tuck the test away in a drawer and not look at it ("avoid disconfirming evidence"). However, as we've learned, our first response might not be the best one. If you are able to think through alternative perspectives, you could think "maybe failing this test doesn't mean I am stupid and I'm doomed to fail at life," and think of constructive solutions like learning better study strategies.

- Motivation isn't bad, but with good thinking we can use our thinking in ways that help *better achieve* those goals. A 'real world' example we use in the workshop: One of the authors has a friend who joined a feminist group, and she was a feminist, but the group would not accept other views on how to best promote women's equality. For example, the group believed the only possible reason women earn less money than men is due to discrimination, ignoring evidence showing that there are also other factors to consider, such as women choosing to work less and spend time with family. If this is the case,

maybe people should focus on other areas in which to promote women's equality (e.g., maybe don't focus on trying to get women paid more but focus on promoting men's ability to take parental leave so women don't feel they have to).

Strategies that may help with this:
- If you notice yourself avoiding disliked conclusions, remember the split-mind approach!
- If it is really a good belief/value, it will stick around even if you are actively open-minded and consider alternatives. Being actively open-minded might even help you find better views, and better achieve your goals.

Ask students if they can think of or have dealt with other obstacles to good thinking, and discuss potential solutions as a group.

Conclusion

Conclude the workshop by summarizing the key points you have covered and reminding students that good thinking involves habits, skills, and mindsets that can be continually improved with practice. Have them set specific goals/implementation intentions for developing their critical thinking skills/habits.

Example summary:
- Good thinking habits
    - E.g. Be fair to alternative views, curious, try to understand deeply, question things, be persistent, careful, humble, etc.
    - Use your strategies you just brainstormed! Practice them in your courses and everyday life.
- Good thinking skills and mindsets:
    - Active open-mindedness: Searching for alternatives, evaluating and selecting more plausible ones, and having appropriate confidence based on this. Often this requires questioning hidden assumptions
    - It helps to create an internal debate/discussion - approach things with a "split mind", that is fair to different sides. All of the things we've discussed today can be improved with practice.

Goal Setting: Before leaving the workshop, have students outline their implementation intentions for practicing good thinking (Gollwitzer & Oettingen, 2013). These intentions should be linked to the specific areas in which the students want to improve. Emphasize the need to be as concrete and specific as possible and to identify plans for overcoming potential obstacles (e.g., "if X happens, then I will do Y").

Example:
Perhaps Student A has recognized that in her most of her classes, she is stopping once she has a surface-level understanding of things, rather than thinking deeply about the content. She could set herself the broad goal of thinking more deeply about the content she is learning in her courses. She might then set the following intention for herself: After I complete the weekly reading for Course X, I will identify one topic that I am curious about, and I will seek out some

additional information on it. The student should also then identify any potential obstacles that may get her way (e.g., "what if nothing sparks my curiosity that week?") and make a plan for how to overcome them ("if nothing from the reading sparks my curiosity, then I will pick the concept/issue I feel is the most important and seek out additional information on that").

Worksheet that can be used for setting goals/intentions:
https://lifelonglearninglab.files.wordpress.com/2017/05/intentions-worksheet-pdf.pdf

References & Additional Resources

American Psychological Association. (2013). *APA guidelines for the undergraduate psychology major: Version 2.0.* Retrieved from
http://www.apa.org/ed/precollege/undergrad/index.aspx

Baron, J. (1996). Actively open-minded thinking. *Almanac, 42* (24).
https://almanac.upenn.edu/archive/v42/n24/teach.html

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment, 48,* 306-307. DOI:
10.1207/s15327752jpa4803_13

Facione, P. A. (2013). *Critical thinking: What it is and why it counts*. Available:
https://www.insightassessment.com/About-Us/Measured-Reasons/pdf-file/Critical-Thinking-What-It-Is-and-Why-It-Counts-PDF
* Includes *Critical Thinking Disposition Self Rating Form* (p. 13)

Gollwitzer*, P., &* Oettingen*,* G. (2013). Implementation intentions. In M. Gellman, & J. R. Turner (Eds.), *Encyclopedia of behavioral medicine* (pp. *1043*-1048). [Part 9] New York: Springer-Verlag. Available:
http://www.psych.nyu.edu/gollwitzer/Implementation%20Intentions.pdf

Halpern, D. (2014). *Thought and knowledge: An introduction to critical thinking* (5th ed). New York, NY: Psychology Press.

Leary, M. R., Shepperd, J. A., McNeil, M. S., Jenkins, T. B., & Barnes, B. D. (1986). Objectivism in information utilization: Theory and measurement, *Journal of Personality Assessment, 50,* 32-43, DOI: 10.1207/s15327752jpa5001_5

Paul, R., & Elder, L. (2006). The miniature guide to critical thinking concepts and tools. (4th ed.). *The Foundation for Critical Thinking*. Available:
https://www.criticalthinking.org/files/Concepts_Tools.pdf

Stanovich, K. E. (2015, January). Rational and irrational thought: The thinking that IQ tests miss. *Scientific American*. https://www.scientificamerican.com/article/rational-and-irrational-thought-the-thinking-that-iq-tests-miss/

Sternberg, R. J., Roediger, H. R., & Halpern, D. F. (2007). *Critical thinking in psychology.* New York, NY: Cambridge University Press.

Svedholm-Häkkinen, A. M., & Lindeman, M. (2017). Actively open-minded thinking: development of a shortened scale and disentangling attitudes towards knowledge and people, *Thinking & Reasoning, 24*, 21-40, DOI: 10.1080/13546783.2017.1378723

List of additional AOT measures: http://www.sjdm.org/dmidi/Actively_Open-Minded_Thinking_Beliefs.html

Toplak, M. E., West, R. F., & Stanovich, K. E. (2001). The cognitive reflection test as a predictor of performance on heuristics-and-biases tasks. *Memory & Cognition, 39,* 1275-1289. DOI: 10.3758/s13421-011-0104-1