

Tools for Teaching and Role-Modeling Critical Thinking

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Abstract

There is much talk about teaching critical thinking today. More often than not, it leads to only teaching facts about mental life, teaching socio-political platitudes and listing traits of critical thinkers. Not only does none of this work, but it usually leads to more crippling effects on any effort to exercise critical thinking. Critical thinking cannot be taught as British philosopher Gilbert Ryle warned long ago, it can only be learned. The most important tool for learning is teacher role-modeling of critical thinking. Teachers are there to model and lure students into exposing flawed arguments and high praise of epistemically strategic moves in an argument. The tools discussed below lead to sources that do just that.

Keywords

Critical Thinking Scripts, Landmines, LFTO (Law of Figuring Things Out), Dispositions, Teacher Role-Modeling, Evaluation

1. Teaching Critical Thinking: An Illusion?

Just recently, famed cognitive Harvard psychologist Stephen Pinker, documented the lack of rigorous and even rational thinking among most students and even recent graduates of our colleges. His documentation underscores something that has been acknowledged for quite some time now (Pinker, 2021). There has been no shortage of ideas describing and advocating the use of critical thinking in schools from K-12. Much of this work however has focused on measurement, definitional theory or advocacy of teaching critical thinking. Most students in education are familiar with the work of Bloom et al. (1956), Sternberg (2016), Paul (1993), Noddings (1994), Gardner (1990), and Gopnik (2010). Each of these and many others have produced interesting and strongly suggestive work describing critical thinking and then writing *about* what it is and how

it should be done. Yet until Matthew Lipman and the Philosophy for Children movement, few showed how critical thinking could be role modeled and practiced (Fair et al., 2015; Kuhn, 2015; Topping & Tricket, 2007; Lipman, 2003).

Fair et al. (2015), Topping & Tricket (2007), and Lipman (2003), in addition to anticipating Pinker's lament have each demonstrated empirically ways that K-12 education can initiate strategies for improving student reasoning abilities.

Philosophers of education such as Gilbert Ryle and R.S. Peters noted variously that some things, such as learning to think critically cannot be taught but can only be learned (Peters, 1966). Ryle famously used the example of learning to ride a bicycle. No lecture can serve to make an innocent an accomplished bike rider. No observation of bike riders is sufficient for riding one's new bicycle. And no one learns to ride a bike by being put on the seat of a bike and being told to ride or fall (as in the legendary story of ham-fisted fathers throwing children into the water and telling them to "swim or drown").

Ryle notes that observing pointed, timely explanations and, practice is required to optimize the chance a novice will become an efficient bike rider. No one of these alone can produce proficiency. The same is true in learning from laboratory skills to critical thinking and evaluation (Ryle, 1954).

2. Student-Building

As the writers above rightly proclaim, learning to think critically is essential for *student-building* (Wagner & Fair, 2020). Student-building is about preparing students for participation in something Wagner and associates call The Great Conversation of Humankind (Wagner et al., 2016, 2017, 2018). The Great Conversation is the intellectual domain wherein participants engage one another in respectful, critical thinking. It aims towards insight involving substantive matters with a consequence to many (Wagner, 2016; Wagner & Benavente-McEnery, 2008). Empirical studies show we can do a better job of teaching critical thinking, especially by utilizing strategies that free teachers from laboring under the threat of insufficient scores on largely irrelevant standardized test scores. A standardized test item may show a student can guess the answer to a test item about the Pythagorean Theorem is 5 if the two right angle sides are 3 and 4 respectively but that gives no indication that they understand the thinking that goes into the relevant geometry (Wagner & Fair, 2022). Drawing on scholars from relevant fields of well-managed thinking, we show below that education should aim higher than recognition to answers on multiple test items and should help students become mindful thinkers in general. This means bringing students into thoughtful reflection and *evaluation* of all they are taught. In a very important sense this echoes the insight of Plato long ago about the importance of leading learners into a new life by helping them turn away from mere shadows on a cave wall as "their reality". Johnson and Tucker argue both for the importance of this educational effort but also for its natural alignment with human cognitive evolution (Johnson & Tucker, 2022).

Scholars in behavioral economics, decision theory, math and business schools,

cognitive scientists, statisticians, social psychologists contributed much to strategies that teachers should role model to students producing more than mere talk about critical thinking (Gigerenzer, 2015). Student-building aims at producing skills of life long-learning and competent evaluation of worthy purposes, theories, experimental design, and personal wants.

Student-building is about learning skills of evaluation and drafting well-reasoned hypotheses and arguments. But it is about more than mere teaching and learning alone. Student-building is definitive of *educational* purpose itself. It is about developing instincts about what is worth learning and what is not. Students can be taught and learn how to torture kittens. But surely, that sort of teaching and learning while easily “schooled” is not what the purpose of education is about. Student-building is about a whole constellation of skills and moral commitments as much as about avoiding vices and sinister behaviors that threaten the well-being of self and others.

3. Functional Focus for Instruction in Strategic Thinking, Decision-Making and Evaluation

Decision theory, logic, and scientific reasoning load muscle into the critical thinking curricular ambitions of educators (Wagner, 2006). These skills of reasoning and their accompanying attitudes and dispositions for reasoning are essential to evaluating data, hypotheses and planning in every aspect of every subject matter in standard curriculums. These skills, attitudes and dispositional deployments have recently been summed by Wagner and associates as constituting a Law of Figuring Things Out (LFTO). The LFTO embraces the entire range of thinking potency. The LFTO goes beyond critical thinking to formal decision- theory, statistical reflection, semantic analysis, and falsification strategies which collectively make figuring things out generally possible (Wagner et al., 2018). Student-building means using the entire range of LFTO resources to take students beyond critical thinking to advanced capacities for expert judgment using abductive, deductive, and inductive inferential strategies (Wagner & Fair, 2020).

When students are given information, it is too often assumed that they have the proper background needed for processing that information. The assumed “proper background” is often little more than what is aligned with the next standardized test and not with likely intellectual challenges that depend on execution of the LFTO to secure real-world success. Relevant information employed in the context of the LFTO frees students from limitations of local culture to engage a more broad and robust sense of context and repertoire of LFTO tools for engaging the world as it presents itself newly each day (Wagner et al., 2018).

Students whose inferential tool set maximizes according to the LFTO, process information in both disciplinary and a global sense leading to better evaluations of plans and protocols and as members of professional or civic communities. They also become more competent in developing plans and protocols ensuring

reliable utility. This tool set results in the following five achievements when students are given an opportunity to share participation in The Great Conversation for the rest of their lives.

1) Students can offer multiple solutions along with relevant justifications for a focused problem frame. This includes the ability to state risks and rewards associated with each solution.

2) Students will avoid confirmation bias and be alert to other sources of noise in statistical evaluation.

3) Students will learn to recognize the value and disvalue of algorithmic approaches to decision-making in planning and evaluating.

4) Students will be able to work in teams to solve problems utilizing respective skills maximizing applicable expertise to address the decision-challenge at hand.

5) Students will be able to use language that is semantically direct and consistent with inferential purpose along with available expert strategies addressing likelihoods of outcome and value of assigned utilities.

Together, excellence in the five abilities above manifest competence in the LFTO in both specific and generalized contexts. Now that you know what student-building should aim for (Wagner et al., 2018), it is time to highlight a few premiere strategies for accomplishing this. These strategies begin with role-modeling and engaging students in the practice of LFTO, focusing especially on critical thinking.

4. The Cognitive “How to’s” of Student Building

There is more to student-building than the strict cognitive aspects described below. Attitudes and dispositions of student-building, including much that is moral and prudential are part of student-building (Wagner & Fair, 2020; Wagner, 2016). The focus here however will be on the cognitive alone.

The single most important moment in any classroom is when someone asks the question: How do you know?

The “How do you know?” question more than any other question sorts through opinions to get at a truth-securing argument. In contrast, questions such as “why?” solicit more opinion than an extended and reasonable justification for truth claims. Teachers and students learn far more from serious justifications than from entertaining unsupported opinions of self and others (Bradford, 2019). Evaluation of truth claims in response to the “How do you know?” question reveals and distinguishes substance from mere opinion (Zagzebski, 2012). If this question is treated as the center piece of education, that alone could change education dramatically. Especially when the “How do you know?” question is followed by similar questions prompting sustained inquiry as opposed to further opinion-giving. The Sustaining justificatory inquiry leads to understanding beyond mere dispositions to recognize a phrase or attitude on a standardized test.

Almost as important as the question above is the question: “What do you mean by the term ___?”. As the ancient Greeks realized, discussions cannot proceed well if people do not define their terms to the satisfaction of all engaged in

the discussion.

In *Thinking Beyond the Test* (Wagner, 2016) and in *Focus on Thinking* (Wagner et al., 2017), the authors note that scientific reasoning, decision analysis and managing critical thinking discussions generally require more than simply floating from one question to another in free floating dialogue. Instead, this pair of pivotal questions forces inquirers to double back at strategic times to reconsider something they may have said only moments before. Doubling back shows that students are becoming aware that more is needed for a satisfactory evaluation of a truth claim. Doubling back in the presence of other discussants also shows fellow discussants that the arguments of others as well as their own are taken seriously, And moreover, that the positions they share need fuller elaboration if they are to be convincing to others for a good reason.

The authors of the two books above also utilize a strategy they name “*landmines*”. Landmines solicit a predictable quick and ready response to a question. Immediately thereafter the authors propose a stinging counter example. The counter example creates cognitive dissonance (Festinger, 1957). The more striking the dissonance the more those engaged find themselves looking for ways to avoid apparent falsification of the original position or create a novel way to circumvent what looks like an obvious defeater for their original position.

The challenge becomes either abandoning a dead end for a path more promising or seeking a novel path preserving the merits of both positions while avoiding the inescapable contradictions. Once employed, the landmine is followed by other questions and hypotheticals advancing the cause of inquiry while not dictating an answer. Rarely does a script ever lead to *THE* answer in the end. Instead, participants stimulated by the landmine effect proceed to identify what inferences or definitions need more thought or clarification and what separates one position from an emerging alternative.

Further instructions for teacher management of such discussions are found in the appendices of each book. Also, there are listings of other practical and focused research centers that teachers can contact for further practical strategies and management of focused discussion. The appendix of *Focus on Thinking* also introduces teachers to simple examples for developing students’ insight into statistical reasoning and other Mindware tools of inquiry (The concept of mindware tools for enquiry was first articulated by psychologist Nisbett, 2015. Finally, in another book, *Thinking ahead: Engaging All Teachers in Critical Thinking*, the same authors show how technical decision theory can be used to identify expected utility and secure it in action by introducing students to the tools of both technical decision theory and technical mathematical game theoretic strategies.

The time to go beyond mere *talk about* critical thinking and move on to classroom strategies that cognitive psychologists and epistemologists have utilized for years is now. Below are some sample script topics from the two books mentioned in the paragraph above.

Truthing, Kissing, Colors, Chance, Probability, Sleeping Beauty, Social Science, Friendship and Authentic Gifts, Government Purpose, Induction and Black

Swans, The Good Life, Risk I and II, Why Be Moral?, Perspective, Luck and Good thinkers. The scripts in each of these books draw students to easy conclusions, which are then deliberately disrupted by skillful exposure to contrary truths. Here lays the secret to learned, potent evaluation. There are at present, no other books that offer such opportunities to K-12 students. Students should not have to wait until college to sharpen their natural inclination to think in potent and revealing ways. And of course educators need to keep in mind the proportion of students going to higher education is dwindling and yet all adults need to advance their evolutionarily derived instinct to figure things out better (Wagner & Fair, 2020).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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