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CHAPTER 12.

NAVIGATING EVIDENCE AND KNOWLEDGE EQUITY

J. NICK FISK

KEY TAKEAWAYS

- Graduate instructors are awkwardly situated in the academy, which shapes their agency in teaching effectively and developing their own teaching practice.
- Evidence is a potentially fraught construct that is nonetheless necessary and accepted in the academy and can be leveraged in lieu of the often-wanting personal authority of graduate instructors to advocate better teaching practices while also developing themselves professionally.
- Principles of knowledge equity, which is foundationed on a pluralistic epistemological approach to knowledge building, can guide graduate instructors to consider a more expansive view and contextual approach to evidence to better serve students.
- Adoption of evidence-supported practices in the classroom needn't happen overnight; instead, it is more tenable—especially for graduate instructors—to shape their practice via sustained but small changes.

STUDENT FIRST, EDUCATOR... EVENTUALLY

Graduate students, by definition, pursue additional understanding and proficiency within a particular disciplinary domain. Unfortunately, most disciplines are not themselves pedagogy. Most educators in higher education, especially graduate students early in training, are informed first by their discipline—the norms, culture, and standards therein—with educational practice being conveyed secondarily, tertiarily, or not at all. This is at least initially the result of graduate admissions across natural sciences, social sciences, and humanities prioritizing primarily domain-specific skills and

writing (Posselt, 2016). Nonetheless, we are expected to teach. Our agency to direct not only minute-to-minute teaching but our own long-term development as instructors is limited by the often conflicting demands of the hierarchical academy, which itself can harm graduate instructors on the basis of their role in the university (Young et al., 2015).

AN EVIDENTIARY ESCAPE

Developing an evidence-based teaching practice is essential to teach effectively and inclusively. Failure to adapt one's teaching in line with evidence-supported practices constitutes a breach of duty at best and negligent harm at worst. For graduate instructors in particular, an evidence-based teaching practice can serve as the foundation for the continual, career-long refinement of their teaching and professional development. Turning to the scholarship of teaching and learning grounds educator development in principled techniques and frameworks not necessarily compromised by the particular institutional culture and structure we find ourselves in. We can instead turn to evidence-based practices to avoid replicating ineffectual elements of inherited instructional styles. There is a vibrant body of work in pedagogy on which to base our teaching practice, and much of it isn't strictly intuitive.

Perhaps this audience does not need convincing as to the utility of evidence-based practices, but I am nonetheless compelled to at least gesture cursorily at several examples. One of the most well-realized examples is the inclusion of active learning activities in addition to or in lieu of lecture (Bonwell et al., 1991; Freeman et al., 2014). Robust bodies of work exist to support that active learning approaches improve student learning outcomes, supporting their incorporation. At the same time, there is also evidence that student sentiment towards active learning tends to be unfavorable even if it results in better outcomes (Deslauriers et al., 2019). Taken together, these sources of evidence, which risk being at odds with one another, can be used to guide transparent and thoughtful active learning experiences that minimize ill-sentiment towards them.

Within each discipline, too, evidence supporting different approaches and practices can further tune interventions and innovation. Specific instruments can be made and calibrated to assess student misconceptions (Newman et al., 2016; Wright et al., 2014), physical models can be designed to hone student mental models (Newman et al., 2018), and approaches to promote expert thinking can be explored. Evidence also suggests that fostering a sense of community and belonging in the classroom improves student and faculty outcomes alike (St-Amand et al., 2017). I could go on, but there are works more focused on enumeration of these practices than the present.[1]

Importantly, "evidence" as a construct is generally accepted in the academy. Evidence-based approaches may offer graduate instructors immediate authoritative leverage in situations where their voices may be minimized due to dynamics of power in the academy by depersonalizing the advocacy of reformation of teaching practices. Rather than challenge rigid systems with admittedly nascent expertise and reputation, we can instead point "to the literature" as a way of justifying adjustments to better serve students. This approach, while admittedly doing less-than-nothing to challenge the underlying systems causes, nonetheless has particular potential for those whose authoritative voices are especially minimized—women and people of color, for instance. This friction between graduate

1. I find Borrego & Henderson (2014) a useful starting point.

student instructors and instructors of record is not contrived; many graduate students ultimately teach with their advisors or members of their committees where the power differentials are established and imminent. Evidence, then, can serve as an escape, if only partially, from the dynamics of power experienced by graduate instructors.

WHAT QUALIFIES AS EVIDENCE?

While essential, evidence-based approaches are not without their limitations. What constitutes evidence and authority varies between disciplines and is often foundationed upon problematic histories that discount marginalized voices and lived experiences. Thus, it is incumbent that evidence be wielded cautiously and critically. Evidence does not speak for itself—it is a component of stories told.[2] What stories are told, how they are told, and who tells them matters. This is no less true in education, which is uniquely positioned to cause or perpetuate harm—for instance, through the school-to-prison pipeline (Gray, 2019) or sustained exposure to institutionalized microaggressions (Nadal, 2008). Further, graduate student status as primarily investigators within our disciplines primes us to evaluate the evidence by the standards of our disciplines, which often vary significantly from evidentiary standards in pedagogy.[3]

When I run teaching workshops and introduce works by authors such as bell hooks or Asao Inoue, my participants (graduate students and postdocs) often resist admitting these works as evidence. Admittedly, one cannot rely exclusively on pedagogical theory, but not even experimentation and quantitative studies are safe from such scrutiny. The seminal work of Freeman et al. (2014) on the efficacy of active learning within STEM, which has reasonably strong quantitative results, regularly fails to pass muster as evaluated by physicists, chemists, and engineers in workshops I run—*even when the premise of the workshop is evidence-based teaching itself*. These participants and, by extension, many instructors carry the evidentiary baggage of their discipline with them as they enter the classroom.

It would be a disservice to the reader if I did not mention that, while evidence has the potential to be used to challenge institutional dogma, a narrow interpretation of what constitutes evidence does more than produce lackluster knowledge: it risks dogmatic reaffirmation of harmful or ineffective systems (Bernal & Villalpando, 2002). Thus, I am a proponent of a broad and contextual interpretation of what constitutes evidence and that what constitutes evidence admissible in knowledge building is simply what is useful for such building, as well as for the enrichment and extension of the knowledge built. One of my favorite distillations of this concept comes from Eve L. Ewing's (2018) discussion of her use of poetry in her largely sociological work *When the Bell Stops Ringing: Race, History and Discourse amid Chicago's School Closures*:

> I bolster my sociological arguments with evidence from a variety of disciplines… I also include poems in every chapter. I find that the poems serve **multiple evidentiary purposes** [emphasis added]: they offer a different sort of first-person account of the social forces discussed in the book, and they provide useful metaphors for reader understanding… (p. 203)

2. Disciplines, then, are just communities that evaluate the quality of the story.
3. This is trivially demonstrable if we consider statistical measures accepted in different fields. Particle physics generally only considers discoveries significant if they are robust to beyond 5σ in one tail of a normalized Gaussian distribution (i.e., a p-value no larger than 3 × 10–7). Such a high threshold for belief in pedagogy (and most disciplines) would render most evidence inadmissible.

Ewing here notes the utility of poetry as evidence in her work and that, as an efficient and evocative writer, the poems serve multiple purposes. That is, while the poetry can stand on its own merits, within the work, it serves a clear role in the collaborative knowledge-building process between Ewing and the reader and thus constitutes evidence *prima facie*. Instructors, then, should not discount forms of evidence used in the scholarship of teaching and learning based solely on those forms being different from evidence they encounter in their discipline.

EPISTEMOLOGICAL PLURALISM: "MANY THINGS GO."

I have, perhaps unhelpfully, established that teaching is filled with difficult to resolve tensions, such as the tension between evidence and the history of the production of that evidence and tension between what graduate students are trained to do and what they are expected to do. I now offer a solution to these tensions: Epistemological Pluralism. Epistemological pluralism is the idea that there are multiple different ways of knowing (Miller et al., 2008). As used here, the term goes further to assert that there *should be* multiple different ways of knowing. In his call for pluralism in the sciences (i.e., epistemology of the natural world), Hasok Chang (2012) insightfully summarizes this position: "The demand for plurality is the most crucial feature of pluralism… A system of practice that denies the rights of other systems to exist would have to be banned in a pluralist scientific regime." (p. 261) Critically, plurality does not itself condemn us to incommensurability, especially of the methodological variety (Carrier, 2001). That is, we are not obligated to admit that there is no metric by which to compare competing theories, statements, or ideas. Nor does pluralism strictly imply a relativist stance, where, broadly, truth is asserted to be narrowly construed and thus facts strongly dependent on the context they are invoked in (i.e., truth is relative) (Adam Carter, 2017). Rather, it simply obligates us to the idea that there could be many valid systems and principles used to know.[4]

In the context of teaching, pluralistic principles can guide instructors to not impose the evidentiary standard of their discipline onto the scholarship of teaching and learning, which has its own standards of evidence. This pluralism-informed approach does not preclude instructors from drawing on the wisdom of their field; rather, it prompts them to consider pedagogy as a field as complicated and nuanced as their own before instinctually evaluating evidence in vocationally-embedded ways. Indeed, evaluating for oneself evidentiary standards, questioning the nature of the authority which privileges certain voices, and critically but meaningfully engaging with models that conflict with their own are themselves features of expert thinking (Adams et al., 2008) expected of graduate students. The metacognitive process necessary to consider and apply different evidentiary standards in their own discipline should also prompt graduate instructors to refine what constitutes evidence within their teaching practice. Ideally, this manifests as instructors explicitly and iteratively incorporating evidence from the body of education research into their own teaching practice while also diversifying the material of their class itself, to the extent that they are able (Duran & Topping, 2017).

BEYOND THE ACADEMY: KNOWLEDGE EQUITY

"Pluralism isn't just diversity; it's something we create out of this diversity" — Diana L. Eck

4. All this is a lengthy way to say that my embrace of pluralism, scientific and otherwise, doesn't mean I must hold in any regard proponents of "Flat Earth", those who propose that 5G caused the COVID-19 pandemic, or those who insist birds are real (see also: Russel's teapot).

Applying pluralism to the construction of knowledge, we arrive at knowledge equity—where both lived and learned experiences are reserved space and respected in collaborative knowledge building. A potent example of a system implementing knowledge equity is integrated knowledge translation (IKT) in medicine. IKT is a collaborative research framework that aims to synthesize experience from knowledge users, including healthcare providers, policy makers, patients, caregivers and members of the public—treating them all as *de facto* partners in research (Banner et al., 2019). On the scale of individuals (i.e., large systemic issues notwithstanding), patient and family engagement is foundational to attaining health equity. This helps shift medical thinking away from "patients as being problems to fix" towards treating them as partners in iterative knowledge building. That is, rather than solely the doctor querying their learned experiences to decipher the semiotic symptoms exhibited by a patient, doctors instead utilize their lived and learned experiences to engage with the lived experiences of the patient, iteratively refining the diagnosis into a form that both resonates with the patient's lived experience and satisfies formal medical reasoning.

The benefits to inclusion of knowledge equity in medicine—and especially in medical education— are not hypothetical: curricula that use knowledge equity are associated with reduced health disparities and increased physician practice in underserved communities (Denizard-Thompson et al., 2021). Likewise, the benefits of implementing knowledge equity in the classroom are not hypothetical. Knowledge equity frameworks recognize that teaching and learning, too, are part (and only part) of a lived experience. Using knowledge equity principles, graduate instructors can begin to build agency in the classroom while empowering their students to synthesize and apply their lived and learned experiences to produce durable knowledge. Consideration and incorporation of knowledge equity in content preparation and delivery facilitates engagement on the basis of *relevance, community,* and *authenticity*—all axes of engagement found in well-regarded teaching frameworks such as the 5E model or Universal Design for Learning (Rose, 2001). Care must be taken, however, as not to exploit the lived experience of students or instructors sheerly for the benefit of the academy: Space and encouragement, not obligation.

As noted in the discussion of plurality, practice of knowledge equity in the classroom (and beyond) does not commit us to necessarily respect all knowledge equally; rather, it obligates us to respect different ways that knowledge is built. At the teaching center[5], we use this case study to prepare instructors for possible "hot moments" which I think highlights this distinction:

> *You are leading a section on environmental hazards and racism. The readings for the course have discussed the prevalence of toxic waste dumps and the high incidence of lead poisoning near low-income communities of color in the United States, as compared with more affluent and white communities. After a long discussion, one student who has been quiet all semester asks, "Why don't these people just move away if there is so much evidence of environmental hazards in their communities?" They go on to add that people living in those communities must not care about their health or that the problem must not be as big as the readings make it seem. You notice some students react to this comment, but they don't immediately say anything.*

Here, principles of knowledge equity do not call on us to accept the student's conclusion, despite it being knowledge formed on the basis of a lived experience (i.e., not having grown up in such a community) and a learned experience (i.e., the readings). In this instance, knowledge equity simply calls for us to acknowledge and respect that the student's lived experience is a valid way of coming

5. The Yale Poorvu Center for Teaching and Learning

to know, even if the conclusion in this instance is harmful. Indeed, an affirmative commitment to knowledge equity in the classroom compels us to interject, deconstruct why the conclusion presented neglects the lived experiences of the people at issue, and to use the moment itself as a lived experience to construct knowledge that more accurately and holistically captures the truth.

Knowledge equity isn't simply a framework to address hot moments. It is best used proactively to build a foundation of trust and engagement within the classroom. I've given a version of the following prompt to teaching workshop participants to stimulate ideas of how to incorporate lived experiences in the classroom:

> *You teach a course focused on child psychology from ages 12-18. You are about to start a unit covering gender and sexuality (stereotype threat, gender identity, shifts in self-concept, etc.). You want to give space and encourage people to integrate their lived experiences into the scholarly discussion, but you want to make sure you do so in a way that is both safe and enhances the experience. What practices can you implement to ensure students feel welcome to participate? How can you check in to ensure your students are finding it a gainful experience?*

In this example, instructors are considering how to preemptively create the space and climate required for students to share and engage with their lived experiences during the collaborative knowledge building process.

I want to acknowledge that there are different courses and disciplines, each of which differ in the ease and degree to which principles of knowledge equity are able to be incorporated. The natural sciences, for instance, have gone to great lengths to excise lived experiences from knowledge building. They treat the human element of research as something to be controlled for or as a limitation of design. In fairness, this practice is not without rationale[6]. However, as I've endeavored to explicate, what constitutes useful evidence in knowledge building is contextual, and recognizing these contexts is evidence itself of expert thinking. I encourage my fellow scientists to acknowledge that teaching science and performing science are not strictly the same: the laboratory of the classroom is distinct. So, while lived experiences may not slot into collaborative knowledge-building seamlessly[7], they merit incorporation all the same.

CONSTRAINED: A GRADUATE INSTRUCTOR EXPERIENCE

Throughout this work, I have repeated that many graduate students have limited ability to shape what is delivered in the classroom. Constraints can be due to exogenous forces (e.g., institutional requirements) or endogenous ones (e.g., inexperience) as well as either over-structured (i.e., verbatim dictation of lessons and content) or under-structured (i.e., being provided little guidance) teaching experiences. Less than a fifth of universities provide three or more total days in professional development for graduate teaching, meaning that teaching experience itself is often the only teaching development received by graduate instructors (Gallego, 2014). Compounding this dearth of training, graduate students are not often "admitted to practice" into their programs by virtue of their teaching practice (Posselt, 2016), nor should this necessarily be the case. Still, this medley of starting points[8]

6. On the other hand, I—a practicing scientist—may have a vested interest in believing such rationale exists.
7. There is an argument to be had that experiential learning, which is prominent in the natural sciences (e.g., lab courses, research projects, etc.), constitutes lived experience a la epistemological empiricism.
8. A medley of starting points, I should mention, that instructors themselves contend with regarding their own students.

makes it difficult, institutionally, to execute gainful development of graduate student teaching. However, many institutions recognize this challenge and, rather than rise to meet it, seemingly throw their hands up in defeat or feign ignorance, leaving graduate instructors adrift without harbor.

BABY STEPS TO GIANT STRIDES

I find the prospect of completely restructuring my teaching practice in response to insightful feedback, interesting pedagogical theory, empirical studies, or to align more closely with my values overwhelming and not practical given the other demands on my time and, frankly, my wanting skill. Instead, I recognize two essential principles:

> *It is the trendline, rather than any point, that determines improvement in my practice.*
>
> *—and—*
>
> *There is no point in preserving human-made systems that don't serve people.*[9]

With these principles in mind, I advocate for iterative and sustainable teaching development. Development is not all about adding—adding indefinitely is not sustainable. Instead, it is also about deliberate subtraction, which is where the second guiding principle shines. What follows are tips and provocations to aid in the implementation of knowledge equity principles in the classroom.

Set boundaries at the onset: It is tempting and effective to model for our students what we hope for them. We can demonstrate expert thinking, for instance, or vulnerability (Blaine, 2014). But while, for some, teaching may be a calling and nourish the soul, it remains a job. Boundaries are necessary and healthy, especially for those who may have lived experiences which are traumatic or disclosure of which imperils their well-being. Do not strip-mine your trauma in service of a system that doesn't care about it. Before you teach, enumerate to yourself, in writing, which of your lived experiences you are willing to use in service of knowledge equity in the classroom. Re-evaluate this list often. Once you have identified what is on the table and off-limits regarding your own life, it will be easier to slot those experiences into discussion and teaching to prompt the reflection in the students as it will no longer be a "game-time" decision as to if it is appropriate.

Put the "student" back in "graduate student": You may not have many (or be unwilling to share) experiences you feel will contribute meaningfully to fostering an environment where lived experiences are respected and welcomed. But almost all graduate instructors will share something in common with their students: they are or were recently learners themselves. Learning *is* a lived experience. You are likely to share common experiences of learning with your students. If you are not comfortable sharing more personal axes of your life or simply don't feel that they merit space in the classroom, then you can use your lived experience of learning to model knowledge equity.

Multiple modalities: Students are people, too. They will have different levels of comfort and boundaries in bringing their lived experiences into the classroom. It is not your job to feel out each student's boundaries and cater your practice precisely to account for all of them. Time does not allow for it, especially in large class sizes. Instead, build multiple modalities—namely form, scale, and anonymity—into your material and vary them (think: UDL, but for knowledge equity). Some students

9. I find these principles are useful lodestars in navigating life outside the classroom, too.

will not share their lived experiences with you or even their peers—respect that. But there are other ways to engage the relevant metacognition and connect students' lived experiences to their learning: provide prompts to relate material to their lives in guided reading, for instance. Scale is also important—if you can build in ways for students to inject themselves into a cumulative term project, great. But equally important are opportunities that are formative and low-stakes, like one-minute papers, so that students don't feel as if their lived experiences are being graded.

Don't discount: Make it clear, both explicitly and through modeling, that multiple ways of knowing are welcome in your classroom. Build it into your syllabus and course compact. Verbally affirm students' experiences when they share. Note that this approach is not without risks. When someone introduces their lived experience as it contrasts to another student's lived experience or in opposition to the material, acknowledge that experience, but don't be afraid to point out why that way of knowing is not the most appropriate or is incomplete in this context. An embrace of knowledge equity is not entertaining all experiences as equally valid—you should condemn ignorance and hate unequivocally however you are able. But do not accost a student on the basis of their lived experience and do not allow other students to do so. Use the material or a discussion to address the issue; if ignorance persists, then the problem is bigger than you. Mitigate the harm to other students and to yourself and move on[10].

Kill your (and others') darlings: When pitching backwards design to new educators, I often frame outcome-oriented learning objectives as a test that course material must pass. *Does this reading actually contribute to any of the outcomes? Is there another reading that can serve multiple objectives? Does this question actually help me understand where the students are with respect to this objective?* You can test the materials, activities, lectures, and assessments against the learning objectives and, with the razor of Occam, trim away all that is not in service of those objectives. When you have a lot of freedom in the classroom, this method helps to constrain and structure teaching in useful ways. But what about those who have all the material foisted onto them from above? Rebel gently and trim it anyway. If something truly won't contribute to student outcomes, definitionally its absence will not be noticeable. Often, we are faced with the scenario where instructors of record will not perform backwards design. They will say, "*Cover x, y, and z*" and give you enough time to cover only "*x*". Like it or not, material will be omitted. So, do so in a principled way that maximizes the probability that your students will be able to engage with the material. That is, even if content coverage is not comprehensive, student engagement on a personal level will improve the chances that students will generalize principles or be able to transfer learning to the omitted content.

Stomaching distaste: For graduate instructors with limited leeway in how and what they present, knowledge equity offers another appealing feature: a way to stomach elements of what is being taught that we disagree with or neglects lived experiences. On one hand, we can accept that the material we are obliged to include represents one way—and not the only way or necessarily best way—of knowing. Acknowledging publicly the nature of how the knowledge was produced and how it may contrast with the lived experiences of many others—some of whom may be in the class—is a means of harm reduction for both students and instructors while not disadvantaging students for neglect of "the canon".

10. While a protracted discussion of mitigation strategies is beyond the scope of the present, I direct readers to Burton & Furr (2014) and Sue et al. (2009) for information on implementation and rationale for such.

Silence is its own statement: When discussing lived and learned experiences in the classroom, it can be difficult to elevate the voices of those whose experiences are often neglected. In many disciplines, such voices may have only been recently (and unequally) allowed into the conversation. When you encounter moments in the classroom where diversity of experiences is lacking, take a moment to point it out. Acknowledge that what is not being said (and who is not being given space to say it) is as important as what is—both within individual works and within the course itself. Ensure that your students know that questioning the mechanisms of knowledge production and distribution does not make them ineffectual scholars; the opposite is true.

Cite your sources: Being transparent with students is essential to earn student trust, which is requisite if students are to include their lived experiences in knowledge construction in the classroom (Winkelmes et al., 2016). Justify to them, as much as reasonable, both the subject-matter materials and your teaching strategies. Doing so will demonstrate that you are being thoughtful about the material (even if you have no say in the matter), and it will also ensure you have carefully considered your teaching. Students famously do not enjoy active learning, even though it works. But they will hate it even more if they don't know that it works. So be transparent not only with the facts you present in your discipline but also with why you are presenting them the way you are. If there is no rationale or evidence for something you plan to do, then remove it.

Listen, and do your best: Some students and peer instructors will have lived very different lives than you or have experiences that exceed your ability to truly empathize or understand. Your failure to understand is not a failing of character or of your vocational responsibility, but refusing to listen and adapt accordingly may be. Ultimately, you have to decide what experiences, when shared, are harmful or do not add substantively to the current knowledge-building task. Inevitably, you are going to get it wrong at some juncture. But by interpreting the words and actions of others generously, and encouraging your students to do the same, you create some space where those determinations can be made. Students recognize effort, too, and, even when they don't, you'll want to know and believe that you listened and did your best (and that you will do better next time).

BRINGING IT ALL TOGETHER

Tomorrow's faculty instructors are today's graduate instructors. The various forces influencing our teaching practice have long since been at work—after all, our lived and learned experiences, too, shape how we approach our teaching practice. Evidence should undoubtedly be foundational to how we approach teaching and we should advocate not only to remove barriers but to improve institutional support for implementation of evidence-based teaching. However, we must take care in the evaluation of what constitutes evidence for the purposes of our teaching. Principles of knowledge equity center the humanity of education, while being founded on firm philosophical and empirical bases. Ultimately, being deliberate about evidence and actively valuing diverse lived experience benefits the instructors, students, and institutions alike. While incorporating knowledge equity into our selection and valuation of evidence, we must also to retain our boundaries and agency through deliberate and considered action and disclosures. Further, we must not over-internalize our role in the valuation of different kinds of evidence in service of teaching as to exculpate faculty and administration of their role in perpetuating ineffective and harmful systems (Bathgate et al., 2019; Ebert-May et al., 2011; Kishimoto, 2018).

As a final note, valuing—not simply tolerating—lived experiences in the classroom is a prerequisite for the sort of radical reforms imagined and fervently advocated for by bell hooks, Asao Inoue, Leah Gordon, Kimberlé Williams Crenshaw, and so many others. Resistance to change, even in small and subtle ways on the lower rungs on the academic hierarchy, is to be expected. Remember:

Tæv uforknyt løs
på problemerne – men
vær forberedt på,
at de tæver igen.

Problems worthy
of attack
prove their worth
by hitting back.

—Piet Hein

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