Project Information Literacy
Provocation Series

Principled Uncertainty: Why Learning to Ask Good Questions Matters More than Finding Answers

The way we introduce college students to research fails to encourage the ethical practice of open-ended curiosity so desperately needed in today's complex information environment.

CULTURE

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FEBRUARY 16, 2022

Drawing from a decade of Project Information Literacy's rigorous research studies, one surprising finding is especially concerning: A large majority of recent graduates from top U.S. universities and colleges reported that they felt that college failed to prepare them to ask questions of their own. Clearly, something important is missing.

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What will it take for students to develop the creativity and confident curiosity needed to pose questions in a world that doesn't always have ready-made and clear-cut answers, especially as opportunists rush to flood spaces of uncertainty with torrents of misinformation and ill-informed conjecture?

The past two years have provided a dramatic illustration of why this learning gap matters more than ever. As the Covid-19 pandemic began to spread across the globe, people turned for guidance to familiar information systems — news organizations, public officials, and the search and sharing platforms that have become invisibly embedded in our everyday lives. But in those early weeks as a frightening novel virus flooded the news, nobody — not even experienced public health officials or expert virologists — knew how it spread, what its long-term clinical effects would be, or what we should do to stay safe and well.

We collectively faced a deadly threat, exacerbated by a worrying lack of solid information. The public tuned into daily news conferences and doomscrolled their Covid-cluttered newsfeeds, hungry for the latest advice. Deep anxiety was fed by an overload of information, a politically divided response to the emergency, and inaccurate facts and figures from usually trustworthy sources. Almost two years later, as a new variant drives up case numbers, we face new sets of unanswered questions: Will a booster shot keep me safe? Will Omicron overwhelm hospitals? Will life ever return to normal?

While such high levels of anxious uncertainty are rarely experienced by entire populations simultaneously, this moment highlights a critical need: Coping with our information landscape requires that we are comfortable with what we cannot know for sure, able to approach uncertainty with curiosity, and have a toolkit of ethical practices for exploration.

What can we do as educators to encourage the ethical practice of curiosity, not just for times of uncertainty but as an everyday habit? What are we doing that inhibits curiosity? How can we pair curiosity with robust ethical practices that lead to creating, evaluating, and sharing information with integrity? And, in an already deeply divided society with a fractured media landscape, how can we be prepared for the ways these ambiguous moments of not knowing can be weaponized to cause confusion and undermine democracy itself?

No Question About It

The way we learn how to explore uncertainties has a profound impact on how we practice curiosity because these two things are deeply and richly interconnected. College instructors are likely to say they assign inquiry to encourage creativity and original thought. In practice many research assignments are designed primarily to expose students to preexisting scholarship and to promote familiarity with library resources and academic writing conventions. Writing and research instruction is often focused on preparation to be successful as students without connecting those skills to what happens beyond the classroom.

In the U.S., writing courses taken in the first year of an undergraduate education, most typically taught through English departments, are the primary platform for information literacy instruction; some 85 percent of librarians involved in information literacy instruction focus their efforts on the first year, according to a national survey. Beyond the first year, instruction about information is less systematic and tends to focus on disciplinary discourse conventions and the specialized resources used in the field.

The information literacy component of a first year writing course is anchored in a task that asks students to write a thesis-driven essay drawing on sources they choose themselves. The first-year "research paper" as a genre and a pedagogy has been roundly criticized by writing instructors since as early as the 1980s, and yet, it remains a standard feature of the vast majority of these writing courses: a recent study found 97 percent of composition courses taught at public comprehensive universities include a research paper.

This research task introduces first year college students to their library's resources and to academic forms of expression, including the proper use of sources and their formal documentation. Students tend to see this exercise as a test of their ability to find and quote from a required number of sources while avoiding plagiarism. Because the authority located in sources is paramount, students may retreat from writing about original questions that can't be clearly answered in the materials they find. This early misstep sets up a faulty understanding of what "research" means in an academic sense and how it engages with the unknown.

A majority of these writing assignments ask students to write about sources in the form of an *argument*. (In fact, a popular textbook for composition courses, first published in 1988 and now in its ninth edition, is titled *Everything's an Argument*.) While the word 'argument' has formal meaning in the study of rhetoric, in the vernacular it carries the connotation of getting the upper hand in a disagreement through persuasion.

Students have long gravitated to manageable and familiar topics like gun control and capital punishment that take a distinct pro/con shape. Sources are not consulted to learn more about a question, but rather to be mined for evidence to support claims. Students new to the university are largely unfamiliar with the academic understanding of argument, but they have plenty of experience with the gladiatorial version performed on talk shows, YouTube videos, in social media, and through the blurring of news reporting, opinion, and entertainment in mainstream media.

If winning an argument is the goal, and evidence is material used to support your side, there isn't much need for ethical practice — apart from evading plagiarism penalties. More importantly, there also isn't space for questions that don't have ready answers. No wonder so few college graduates reported they'd learned to ask questions of their own.

Can You Put That in the Form of a Question?

This confusion is reflected in that troubling finding in the 2016 Lifelong Learning study, *Staying Smart: How College Students Continue to Learn Once They Complete College*. The national survey of 1,651 recent graduates found that, while most respondents felt college had helped them learn how to find, evaluate, and analyze information, only a minority, less than a third, believed their education had prepared them to formulate questions of their own, an essential step for engaging in authentic inquiry. (Graduates who majored in physical and life sciences and students who attended liberal arts colleges were somewhat more likely to feel their education promoted questioning, but even in these categories a majority did not.)

Why did so many college graduates feel their education did so little to help them raise their own questions? Some have argued that asking questions is a skill that must be taught and practiced. While most instructors would claim they encourage questioning, the scope of what sort of questions can be raised in a classroom situation is usually conscribed by specific curricular goals set by the teacher and disciplinary culture. In these situations, students often assume the instructor already knows the answer. As a result, learning to ask questions becomes a Socratic form of enculturation to sociology or history — these are the kinds of questions we talk about here — rather than a transferable habit that can be used in novel settings.

An earlier PIL study provides additional context. In interviews, employers in a range of industries reported that recent graduates lacked a tolerance for ambiguity and the ability to make use of the iterative process of letting new questions flow out of an initial question, rather than hurrying to find an answer. In the same study, recent grads contrasted their school experiences with the challenges of the workplace, where tasks were not accompanied by a structured set of guidelines and clear markers of completion. As one graduate put it, "my job is literally about finding information that does not exist" (p. 16).

The implication is that this employee's previous research experiences, constrained by the academic calendar and the specific criteria of an assignment, abounded in finding and analyzing information produced by others, but not in finding a novel route for investigation with an unpredictable endpoint. Yet employers were more interested in their bright new hires working collaboratively to solve complex problems than in coming up with definitive answers.

Ask the Algorithm

Another factor may be at work, too: Though college students use scholarly sources found in library databases as well as the web to complete research assignments, the rise of Google Search as a feature of our daily lives may have conditioned us to think that the point of asking a question is to find answers as efficiently as possible rather than to dig into issues and explore their complexity. In its early

years, the search engine's lack of intrusive advertising, comparatively effective page rank system for surfacing relevant links, and vast scale, announced by the metric of retrieved links that appeared prominently above results, promised clarity and abundance.

But with the 2014 addition of knowledge cards — snippets of information, most often drawn from Wikipedia — abundance took a back seat to efficiency. You no longer had to browse through links on the front page to get an answer. By 2017 the answer could be read aloud to you in a helpful woman's voice, thanks to Siri, Alexa, or Google's own Home virtual assistant.

Google Search is not only ubiquitous, the concept of search has supplanted the process of organizing the information in our emails and documents into self-chosen categories. We increasingly surrender the organization of meaning to a corporation and its preferred invisible processes. And though the answers to a web search will vary widely depending on the keywords you use and are, in turn, manipulated by people who use specific keywords to push their pages higher into the results, the display of links appears to be entirely neutral, unbiased, just the facts. In a sense, the distinction between Google, the platform, and the documents it retrieves are dissolved; the snippets of documents are severed from their context. Search becomes a highly efficient consumer experience.

This conception of search treats Google as a convenient function you use on a daily basis to find a bus schedule, an address, or to learn about current events. Its results list does little to distinguish between easily ascertained facts and complex or controversial topics. It welcomes all kinds of questions and treats them in essentially the same way. Functions once available, such as the "advanced search" option that prompted users to create more targeted searches, were removed by the company, and sophisticated search parameters were no longer supported. Inquiry, rather than being open-ended, is transformed into an act of selecting the answer you want based on an algorithmically selected set of options.

In response to Google's cultural dominance, and to web design trends that position searchers as consumers, library websites have largely adopted the simple "one search box" design to hide the messiness of research. This privileging of simplicity and efficiency implies that if your search doesn't lead to satisfying results quickly, you must be doing it wrong. In reality, authentic and open-ended research is messy and complex, as is the media landscape that Google indexes.

The Weaponization of Uncertainty

Given the way Google and other algorithmic information systems have changed the way we encounter and seek information, all in the service of displaying targeted advertising, it is unsurprising that deciding what information to believe has become a matter of consumer choice. Those who want to influence beliefs can use these advertising platforms and their affordances to shape public opinion, selling ideas just as effectively as selling a pair of shoes. But it's not only a matter of direct persuasion. Our psychological responses to uncertainty can also play into the acceptance and spread of dubious information.

Uncertainty can cause so much cognitive and emotional discomfort that people seek explanations that provide structure and someone to blame. Conspiracy theories provide epistemic coherence, a sense of control due to being in the know, and the social affirmation of belonging to a group that is under attack by sinister forces but is working together to fight back. It may be entertaining because it provides a dramatic narrative with heroes and villains. Ironically though, it may also heighten anxiety.

Belief in one or more conspiracy theories is widespread, with half of Americans believing at least one of them according to a 2014 study. The authors didn't tie this proclivity to a particular political alignment so much as to the disposition to believe malevolent hidden forces shape events, that mainstream institutions are involved in a cover-up, and that world events can be understood as a Manichean struggle between good and evil. (Some conspiracy theories appeal to people across the political spectrum, but when a conspiracy theory is tied to public policy, uptake is stronger among Republicans.)

In any event, conspiracy theories offer an explanation of ambiguous or unexplained phenomena, and so can be used as a vehicle for division in times of uncertainty. From the early days of the pandemic, conspiracy theories have been used to assign blame, promote distrust of authorities, and build in-group solidarity. And they have the advantage of moving faster than science, as alternative narratives that promise definitive information are propagated widely while scientists are still in the lab, investigating new variants.

Uncertainty can also be weaponized to challenge the consensus of experts or generally-held beliefs, undermining trust without having to provide an alternative narrative. Anyone who has interacted on social media has encountered this at some point when an antagonist undermines a position with the seemingly anodyne phrase "just asking questions." This "sealioning" approach has been institutionalized by RT, the Russian state propaganda network, which adopted the slogan "question more."

It has also been brilliantly exploited to defend tobacco companies from scientific consensus that smoking causes cancer and to protect the fossil fuel industry from regulation to slow climate change. Rather than provide a coherent alternative, this strategy seeks to undermine certainty and introduce doubt about matters that are settled by consensus. Launching election "audits" and claiming stricter voting laws are needed to soothe widespread doubt about the 2020 presidential election (after systematically sowing and nurturing doubt) are current examples of this strategy.

A third way in which uncertainty is exploited is through concealing serious intent behind raunchy playfulness. Though anthropologist Gabriella Coleman and media studies scholars Whitney Phillips and Ryan Millner have traced this kind of intentional ambivalence to folklore and the figure of the trickster, it has blossomed online, from its roots in the anything-goes image boards of 4chan and 8chan to insurgent political movements and to mainstream political communication. A recent example of this exploit roiled the U.S. legislature when a Republican representative Paul Gosar adapted a meme based on the anime series *Attack on Titan* to show him and members of his party slaying another member of congress and attacking the president. Though he was ultimately censured by the House, he was unrepentant and retweeted the meme, which he said was a "cartoon" intended to symbolize a policy dispute; others felt it clearly was coded speech intended to intimidate his opponents and encourage violence.

By utilizing popular culture references and outrageous excess, messages can be dismissed and reactions disarmed by framing antagonists as humorless and out of touch, unable to take a joke. These messages also perform the work of social bonding — those who are in on the joke (such as embracing the phrase "let's go Brandon" arising from a sportscaster misunderstanding an obscenity aimed at the president) circulate it widely to signal their group identity.

Though many writing instructors and librarians have tried to address this complicated media landscape with lessons on disinformation and "fake news," the high-stakes writing assignments that are the focus of most college information literacy instruction do little to address how information works in this media landscape of deliberately fractured meaning — and fail to draw connections between ethical behavior in scholarly inquiry and information ethics in everyday life.

Curiosity devoid of integrity can lead questioners down a rabbit hole of disinformation. Developing the ability to ask meaningful questions in the face of uncertainty requires both a disposition toward open-ended curiosity and an understanding of the ethical practices that support inquiry with integrity. When information-seeking is cast as a matter of making personal choices or winning arguments, social responsibility can seem to be in conflict with self-interest (which, in late capitalism, has become the definition of "freedom"). That conflict is ripe for exploitation and in-group/out-group antagonism.

Individualism Versus Expertise

While political machinations have played a role in generating conflicting responses to the pandemic, there is still another factor at work. As Anita Sreedhar and Anand Gopal have pointed out, one reason widely different groups resist vaccines is tied to the ways the social safety net has been deliberately unraveled over the past 40 years, reducing the state's role in collective wellbeing. If one's health and welfare are presumed to be the result of one's life choices, if responsibility is shouldered alone, people have little reason to believe the government suddenly has their interests at heart.

If higher education is seen as a luxury good for those privileged enough to afford it, those left out are unlikely to feel its experts take their needs seriously. If healthcare is unaffordable, medical professionals must be in it for the money. When we are all suddenly faced with life-and-death decisions at a global scale after decades of being told "you're on your own," asking people to trust the experts will not work.

Likewise, our current predicament calls for a different approach to information literacy. Telling students to trust sources based on the credentials of the author and the prestige of a publication turns information seeking into an individual consumer choice reliant on an academic branding scheme. Despite this all-too-common practice in classrooms, academic credentialing can mislead us.

In a notorious example, men who worked with tobacco companies and fossil fuel interests to undermine the public's understanding of cancer risks and climate change were highly-credentialed scientists, but they were motivated by political beliefs to weigh in on areas of science outside their area of expertise. They used their "brand" to hoodwink legislators and the general public. And it worked. We can't understand information purely in terms of personal responsibility and savvy consumerism, and we shouldn't teach it that way.

One of the challenges faced by people in traditional information-seeking social institutions (journalism, science, academia) is that they are bound by their Enlightenment-influenced training to attempt to erase themselves in the pursuit of objectivity. It depersonalizes knowledge-creation, as if it is an inert substance produced by machines at an information factory. "Trust the science" was a phrase often used by those who supported public health mandates, but that simplistic appeal replaces uncertainty with uncritical trust in a remote group of people doing things that ordinary people should not question. (It calls to mind Hillaire Belloc's satirical verse which describes a lifeform too small to be seen and concludes "Oh let us never, never doubt what nobody is sure about.")

In contrast, internet influencers and political talkshow hosts cultivate parasocial relationships with their audience that blend the personal and the political and appear relatively unrehearsed, genuine, and authentic compared to institutions that they fault for being all part of a snobbish liberal elite. Both positions — science is good; science is corrupt — are overly simplistic and ignore the human processes and self-regulation that lead to legitimate expertise.

Knowledge is a social project. It's a collective effort to understand the unknown by continually probing the edges of what we believe to be true, weighing new evidence to decide whether it adds to our understanding or if it somehow challenges what we thought we knew. While every academic discipline has its own methods and practices, there are some underlying commonalities that apply across the board — and they can be learned, even by first-year college students.

Pursuing knowledge with integrity involves caring for the advancement of understanding, not personal or in-group benefit. This pursuit should strive for fairness and avoid adopting or rejecting evidence merely to strengthen an argument. It should ask questions that are open-ended rather than start an inquiry with a predetermined goal in mind. It should seek out a diversity of approaches and voices without succumbing to simple binaries that give fringe or self-serving ideas equal time. It should minimize the risk of an investigator influencing the outcome of research; though objectivity is a chimera, care must be taken to step back from one's perspective to see a broader picture. Seek the truth, not the win.

These are principles students can learn and practice, but it means turning away from writing assignments that frame success as using rhetorical skill and well-branded source material to compose winning arguments. It means helping students focus on finding out rather than finding a specified number of sources. It means redirecting our discussion of how information works from a narrow focus on rehearsing academic discourse practices to seeing it as an ongoing social activity in which one's curiosity and integrity are essential. It means learning how to craft good questions rather than locating and describing other people's answers to bolster a preconceived thesis.

Werner Heisenberg famously discovered the "uncertainty principle": The laws of cause and effect found in classical physics don't adhere in the quantum realm, where it's impossible to measure both the position and trajectory of a photon with certainty. The best you can manage is probabilities. In a sense, this is true of knowledge in general. Rather than being a body of facts, knowledge is a collective effort of trial and error guided by a common set of methods and ethical standards. As science writer, Ed Yong, puts it, it's "a slow, erratic stumble toward ever less uncertainty." This doesn't mean we can't act until we have complete knowledge. As Zeynep Tufekci pointed out, when the new and worrying Omicron variant was identified we knew next to nothing about it, but that didn't matter; we already knew what we should do immediately to protect public health.

The job of information literacy is to help students embrace their role in the collective effort of stumbling toward understanding, to have the confidence to ask questions that may not have easy answers, and to have ready to hand the ethical tools to inquire with integrity.

What Could We Do Differently?

It may be that today's students, used to a certain kind of learning that provides clear roadmaps and defined boundaries, find open-ended inquiry disorienting. Early adults growing up under the oppression of an educational testing regime have had little practice in diving deeply into making assessments of what can be known and what their role in knowing is, at least in an academic setting. Student development theories, including Perry's scheme of moral and intellectual development, King & Kitchener's concept of reflective judgment, Belenky et al.'s *Women's Ways of Knowing*, and Baxter Magolda's theory of self-authorship, posit that students develop from believing knowledge is certain and external to them to a more nuanced approach toward accepting complexity and understanding their own role in making meaning.

Though the 2016 *Framework for Information Literacy* highlights the concept that authority is constructed and contextual, many students' school experiences will have emphasized that authority lies in the teacher and the textbook. If their previous school experience has primarily focused on finding correct answers, they may have had little incentive to treat knowledge in the classroom as something that is negotiated, or that it is a creative process they are allowed to participate in. That sense of permission is especially tricky for new undergraduates trying to cross the bridge from high school into college, faced with reading, composing, and discussing ideas in the context of an unfamiliar academic culture where the stakes are higher.

That said, it may be that students are further along in their ability to weigh claims and make critical judgments than it appears. To tap into what students already know about negotiating meaning, we can start with students' lived experiences. Thanks to their social media engagement, they often have a sophisticated understanding of how rhetorical moves and platform infrastructures are shaped to influence audiences. They may well have developed their own sense of what meaning-making behavior online is ethical or not.

Before asking them to decode an academic library's systems and compose texts that mimic unfamiliar academic discourse practices, have them discuss how they create, share, and process information in their own lives and how they make decisions about the truth-value of the things they encounter or seek in everyday life. After surfacing their own implicit beliefs about what makes for a good ethical practice in online communication, they can compare those approaches to meaning-making in academic work and, with guidance, see how much they already know that will help them in this strange new world.

Long before asking students to choose a topic to research, give them practice asking questions — not the kind of questioning that is limited to critiquing someone else's ideas, looking for faults, but genuinely curious and open-ended questions. Why is this? Where did it come from? How is it connected to other things? What are the implications? This practice of intellectual curiosity, named as a disposition in the *Framework*, could start with course readings or events on campus or in the world, and could take the form of crowd-sourced curiosity, building on one another's insights, moving out from a source rather than breaking it down into small pieces. This models curiosity as community-based questioning and promotes a sense that scholarship is a conversation.

Once ready to embark on a project, think about asking students to *find out* rather than *find sources*. That changes the role of information sources and encourages making sense of multiple texts rather than mining individual sources for usable quotes. As an example, one instructor cultivated curiosity about a place in an urban park, the site of a late 19th century World's Fair. Rather than begin by explaining how to use the library or how to make sure sources were acceptable (and how many were required), he focused on helping them generate questions. Students then figured out on their own how to find out what they could and shared what they found, making connections and drawing on one another's ideas. This process tapped into their existing knowledge about how to find information (rather than implying their usual methods were deficient) and made the process of understanding something unfamiliar social by pooling their discoveries and insights. Moreover, it shifted the locus of authority from other people's writing to their own discoveries and interpretations. The writing task that followed was to add material and documentation to an existing Wikipedia page about the World's Fair rather than each student writing a separate argument based on what they found with only the instructor as an audience.

As students begin to find and weigh evidence, rethink how source evaluation is discussed. Alaina Bull, Margy McMillan, and Alison Head argue that we should deemphasize the consumerist position of the individual information seeker making a selection among options and

instead help students consider the ways information is networked and, in many cases, algorithmically turbocharged to find an audience.

> This change in thinking allows us to move from *reactive evaluation,* that is, "Here is what I found, what do I think of it?" to *proactive evaluation,* "Because I understand where this information came from and why I'm seeing it, I can trust it for this kind of information, and for this purpose."

This approach gives students a more creative role to play in situating themselves as participants in networks that make meaning together, rather than seeing themselves as individuals acquiring a set of prefab materials to assemble into a product, as if building a piece of Ikea furniture, anxiously consulting a confusing set of instructions with the expectation that they mustn't add any pieces of their own.

For librarians who work with first year students but don't teach credit-bearing courses of their own, reimagining the ways information literacy is taught may seem impossible if they have to work within the constraints of an assignment someone else created and are simply asked to explain how to find and select sources in an academic library. Consider ways to host conversations with those instructors, open-ended and curious discussions about what students need and what barriers might inhibit assignment design that promotes curiosity.

In most cases, librarians and writing instructors have similar goals and face common challenges. They are teaching at the service of others. They have only so much time to develop complex skills and insights in students who may feel it's all a waste of time. Those who do this work are often taken for granted and given little power or respect, even though both communities of practice, librarianship and writing instruction, have deep wells of professional expertise cultivated through academic conferences and extensive bodies of literature. Having the opportunity to spend time in conversation to share what we know and what we hope to accomplish would produce better learning opportunities for students and instructors alike.

An approach to uncertainty grounded in curiosity invites students to claim their own authority as they formulate their understanding. If we support them when they venture into the unknown and give them the tools to move forward with integrity, they will be able to explore territories their teachers haven't already mapped.

Redesigning instruction to equip students to ask better questions must itself start with good questions. What can we do to encourage genuine curiosity? What classroom activities could provide students with experience in framing questions? What do students already know, and how can we give them permission to bring themselves into the process of making meaning as a social act? How can we talk about the ethics of good inquiry? How may assumptions students have absorbed through schooling that inhibit their creativity and curiosity be overcome? How can we address students' anxieties and insecurities as we connect this scaffolding for inquiry not just for college, but in the world?

In the end, there's one simple question we must ask ourselves: How can we do better? Answers may be elusive, but we need to make a start.

Read the author's reflections on what inspired this essay
Discussion questions for reading groups

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Preferred citation format:

Barbara Fister, February 16, 2022, "Principled Uncertainty: Why Learning to Ask Good Questions Matters More than Finding Answers," *PIL Provocation Series*, *2*(1), Project Information Literacy Research Institute, https://projectinfolit.org/pubs/provocation-series/essays/principled-uncertainty.html.

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