

Infrastructure's Promise: Designing First-Year Writing Courses Alongside GenAI

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This paper examines the redesign of a first-year writing course for science majors at Montclair State University in response to the challenges posed by generative AI (GenAI). The redesigned course, “The Emerging Scientist,” embeds critical thinking and writing skills within experiential and process-focused assessment designs, positioning GenAI literacy as one component of broader learning objectives rather than the primary focus. Early data suggests the course successfully lowers DFW rates while enhancing student engagement. Drawing on Deb Chachra’s writing on infrastructure and Caitlin Martin’s framework for “deep change” in Writing Across the Curriculum (WAC), the paper explores how focusing on relationships between pedagogical elements, institutional stakeholders, and student experiences generates more productive questions and the potential for deep change. The paper concludes that ethical innovation in writing instruction during this disruptive technological moment requires grounding course design in infrastructures of trust, belonging, and collaborative relationships that support student agency and learning.

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I recently joined the faculty of the Writing Studies department at Montclair State University, an Hispanic-Serving Institution (HSI) in northern New Jersey. The responsibilities of that position made me very excited to begin this new chapter of my career. I joined a vibrant Writing Studies department that teaches more sections of general education courses than any other department on campus. A significant responsibility of my position was to foster interdisciplinary programming between my home college of Humanities and Social Sciences (CHSS) and the College of Science and Mathematics (CSAM). My first task was to collaborate with one of my new colleagues to redesign a first-year writing course aimed specifically at CSAM majors called “Writing in Science.” That course was relatively new, but it needed development. Students were not engaged with the content and increasingly resorted to generative AI (GenAI) to complete homework assignments.

In some ways, this new challenge felt familiar. In my previous position, part of my job involved developing interdisciplinary, team-taught courses in an innovation-focused teaching and learning lab. Collaborating across disciplinary lines is therefore something that I'm comfortable with that also brings me great joy. Aspects of this new challenge made me nervous, however: the student body is vastly different than that of my previous institution; the course needed to scale to fill a writing intensive general education requirement for approximately 1,000 science majors per year; and the project needed to also serve as a signature expression of collaborative interdisciplinarity between two colleges who had not worked together closely before. The question of how to approach GenAI hung over these already considerable design variables like an ominous cloud. What does a first-year writing course in the age of GenAI look like, and how do we know what students are actually learning?

It's too early to have definitive answers to these questions, but this project has been (and continues to be) a thrilling and successful adventure. The students are wonderful, my colleagues are great, and the specificities of Montclair have prompted me to think carefully about the relationship between general education courses and specific campus contexts. GenAI is part of that inquiry, but it's not really my primary focus. Rather, I'm more interested in how to design a first-year writing course that intrinsically motivates students to think and write before they turn to AI.

Since I'm exploring a design challenge that connects technology, classroom practice, and college-level interdisciplinary collaboration, I've paired two scholars from very different backgrounds to help me think through my redesign journey. Engineering professor Deb Chachra's *How Infrastructure Works: Inside the Systems that Shape our World* (2023) is a deep meditation on how seemingly invisible infrastructure such as water systems shape individual agency and collective equity. Given how GenAI has become entangled with so much of our teaching and learning infrastructures, I'm thinking alongside Chachra to better understand GenAI within broader infrastructural contexts rather than solely as a question of implementation.

Over the course of my first year in this new position, my role as interdisciplinary designer has become very much aligned with Writing Across the Curriculum (WAC) theory and practice. Writing Studies scholar Caitlin Martin's "Beyond WAC: Transforming Institutions, Transforming WAC through Deep Change" (2022) serves as a useful WAC entry point and a productive pairing with Chachra's understanding of infrastructure. Where Chachra is helping me to understand infrastructure and agency, Martin discusses the importance of a theory of change to facilitate sustainable transformation of college writing.

Both scholars are useful thinking partners as I explore the design of first-year courses in my new position. They may be useful to WAC/WID (Writing Across the Curriculum/Writing in the Disciplines) directors and others invested in writing course design, particularly those who seek to make ethical and effective design choices that include (but are not dominated by) GenAI. After a brief discussion of Chachra, Martin, and responses to GenAI in our field, I present a brief analysis of the Montclair science writing course redesign and how GenAI shows up in it. I conclude by presenting some tactics I believe move our project toward the kind of deep change that Martin calls for in WAC practice.

Infrastructure and Change

In *How Infrastructure Works: Inside the Systems that Shape Our World*, Deb Chachra (2023) made a point that seems blindingly obvious but one that many of us take for granted. Access to electricity and potable water means we don't have to spend countless hours cooking over campfires or walking miles to the nearest well. We can stay warm more easily, in winter, and electric light means we aren't so limited in our choices once the sun goes down. As Chachra explained, "infrastructural systems, by their nature, are more than just technical—they're inextricably social and political because they are intrinsically collective." (p. 120). Access to collective infrastructure is key to personal agency, and the breakdown of shutting off or not adequately regulating infrastructure is the basis of inequality.

The idea that GenAI should become government-regulated infrastructure that grants us collective agency, like access to electricity, has long been in circulation (see Gideon Lichfield 2025, for example). Instead, GenAI consumes vast amounts of electricity at huge environmental cost, remains federally unregulated (in the US, at least), and has created massive upheaval across all sectors. As teachers of writing, we do not need to read Hua Hsu's "The end of the English paper" in *The New Yorker* (2025) to understand the havoc GenAI is having on student learning. GenAI is already woven into the teaching and infrastructures teachers and students rely on daily. Our learning management systems, plagiarism detection software, search engines, and even our email and word processing platforms increasingly incorporate GenAI capabilities, making binary arguments about "using" or "not using" AI increasingly difficult to make.

Writing Studies has already provided so many thoughtful responses to GenAI to draw from I have space to mention just a few. There are resources on why and how and when to refuse AI completely (Jennifer Sano-Franchini et al, 2024). Robert Cummings, Stephen Munroe, and Marc Watkins experiment with GenAI in the first-year writing classroom in the first of two special issues on GenAI already published in *Computers and Composition*. I'm grateful for *TextGenEd* (2023), partly because the edited collection gathers many creative

assignments, but also because editors Annette Vee, Tim Laquintano, and Carly Schnitzler situate GenAI in the context of a much older tradition of generative text technologies. The “AWAC Statement on AI and Writing Across the Curriculum” (AWAC Working Group on AI in WAC, 2025) provides clear and compelling principles, reaffirmations, recommendations, and resources. The advice that struck me most deeply arrives at the end of the statement, before the appendices: “Together, these recommendations underscore a central premise of WAC work: that writing instruction is most effective when it is context-aware, collaboratively supported, and rooted in inquiry” (p. 15). Channeling Chachra (2023), it’s better to lean into the infrastructures we know grant us collective agency as we respond to and design alongside disruptive technologies.

Thinking about how existing writing infrastructure can help us transform writing across our institution requires a commitment to “deep change,” according to Caitlin Martin (2022). Adapting the work of Adrianna Kezar (2018), Martin argued that sustainable transformation requires developing a theory of change that works simultaneously at two levels: first-order changes such as adjustments to behaviors, structures, and policies, which we might consider to be a kind of visible infrastructure; and second-order change such as shifts in beliefs, values, and attitudes that are less immediately apparent. Deep change only occurs when both orders of change are present (Martin, p. 14). Next, I interpret the development of “The Emerging Scientist” as a kind of “first order” infrastructure, and I conclude by describing how aspects of second order change are already emerging in our work.

Designing Infrastructurally: “The Emerging Scientist”

During the summer of 2024, I began working to redesign “Writing in Science” with a new colleague, Liz Martin. Liz had taught earlier versions of the course and at the time served as associate director of the first-year writing program in the Department of Writing Studies. Liz discussed with me the specifics of campus culture at Montclair and the kinds of pressures students face that may have contributed to lack of connection with the course and their reliance on AI. Students often jostle school with work and family commitments, and many are unclear about the direction of their professional futures when they arrive on campus. At Montclair, 45% of the student body identify as Hispanic. Nearly half receive Pell grants, and 44% are first generation college students (Montclair State University, 2023). Montclair supports its diverse body of students through many initiatives and services that enhance student belonging. Terrell L. Strayhorn (2018) defined belonging as “students’ perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the

campus community” (p. 4). This commitment to connectedness, care, and support is reflected in the newly redesigned general education curriculum, SEEDS, which is focused on self-discovery and exploration.

The connectedness and support that scaffold student belonging are also integral to the design work this project required. Leadership in writing studies and across both colleges has provided resources to make the design work happen. Over the past year, Liz and I have built a collaborative relationship based on trust and creativity that is amplified by colleagues who have joined us to teach and improve the course. Our students have responded well to the new direction and teach us daily how to make their learning better. Collaborative relationships built from trust and that spark joy and are vital to an infrastructure that empowers our collective agency—particularly as we design in response to a technology that cannot understand human experience. It is with this collective effort and spirit in mind that I offer up the following design strategies that have shaped how this course was designed.

1. Embed reading and writing instruction in experiential learning opportunities.

Earlier iterations of this course focused on genre instruction, but many of the students didn't have a clear sense of their academic or professional futures and couldn't connect with that work. Mya Poe, Neal Lerner, and Jennifer Craig suggested that science and engineering students learn better when they see how technical genres “are shaped by the contexts in which they are produced and the social exigency of that production” (p. 10). We have built on this insight across several assignments to foster a greater sense of belonging among our students. For instance, we introduce students to reading professional research by first reading about science breakthroughs that are reported in the media, tracing that scientific intervention backward to press releases and academic abstract databases, and only then commit to understanding how to read original research. When learning to compose science reports, students perform a simple and fun experiment in class where they measure the absorbency rates of different brands of paper towels. Assignments like this help students to understand professional research in the context of its circulation and impact, as well as to practice technical writing genres.

2. Enhance students' sense of belonging by drawing on expressivist and reflective writing techniques.

In his exploration of what he calls the “tacit” tradition of expressivism in writing studies, Eli Goldblatt (2017) isolated what he considers to be four

“legacies” of the tradition, the first of which speaks directly to fostering a sense of belonging. “The individual, embedded in culture and history,” Goldblatt wrote, “must find a way of being in the world through expression that cannot be adequately prescribed by textbooks, standardized curricula, or social norms” (p. 443). Liz and I prioritized what Goldblatt called “a way of being in the world” by kindling a sense of wonder among students about science and how it is communicated. The course begins with “My Journey as a Scientist,” an adapted literacy narrative written initially as a series of blog posts that we later edit into a single narrative. Throughout the semester, students report back to the class about examples of science they encounter in their everyday reading and media consumption practices in an assignment called “Science in the Wild.” Students have found inspiration in all sorts of media and genres, including true crime podcasts, children’s books, and sports commentary. We complement these personal explorations by teaching students to write ethnographic-style observations called field notes. These enable students to observe and document how science and their own experience as writers and learners surfaces, not just in class, but throughout their daily lives.

3. Encourage students to form a deeper connection between their thinking and writing by introducing GenAI editing assistance to texts that relate to students’ direct experience.

We ask students to not use GenAI during the first half of the semester, which gives them time to connect more deeply with the personal writing and experiential qualities of the assignments and readings. In the second half of the semester, we introduce GenAI readings on ethics and literacy practices. We ask students to feed their ethnographic-style observations into the audio tool built into Google’s Notebook LM software. The audio tool creates a (somewhat scarily) realistic-sounding podcast of two GenAI-generated voices discussing the themes of the students’ field notes. Students often delight in having their writing being the subject of a podcast, but don’t always agree with the interpretation of their lived experience provided by the nonhuman hosts. This fun assignment serves as an excellent staging ground to discuss GenAI’s inability to connect with lived experience beyond manipulating language. Throughout our AI-related discussions, we strongly emphasize the critical importance of writing from experience first and editing with GenAI later. To model that principle, students learn to edit with GenAI using long-form narratives comprised of their “My Journey as A Scientist” blog posts and collaboratively-authored experiment reports.

4. Use process-based portfolio methods to help students and their teachers to better understand what learning is taking place.

To assess the course, we employ a portfolio model called the “Learning Record” (Syverson, 1999). Throughout the semester, students gather evidence of their learning in the form of drafts, finished projects, field notes, notes on readings, presentations, and even materials for other classes that students believe contribute to their learning in this course. Using the Learning Record as our assessment method has several benefits. It offers students a metacognitive infrastructure by presenting them with the opportunity to reflect upon and interpret their learning. The portfolio model reinforces the experiential and expressivist approach of many of the course assignments, and it scaffolds students’ academic writing ability by teaching them to present and analyze evidence. Finally, the reflection-based structure of the portfolio provides students with space to reflect on their own use and attitudes toward GenAI, potentially giving instructors and administrators valuable insights. Research is emerging that assessing GenAI use is proving to be difficult in undergraduate learning (see Thomas Corbin et al., 2025). I offer that process-based portfolios, an important tradition in writing studies, could be important across disciplines as instructors grapple with GenAI and assessment.

Happily, “The Emerging Scientist” redesign has been enthusiastically received by CSAM leadership. In December 2024, Liz and I trained 11 instructors to teach 20 sections in the Spring of 2025, and we hope to be ready to serve nearly 1,000 science majors across 50 sections by Fall 2026. We have welcomed the ideas and expertise of our growing faculty team as we design iteratively, and we hope to learn more from an IRB-sanctioned study that is currently under way. Early grade data from our first two semesters already suggests that this course is having a very positive impact on lowering DFW rates (students who earn a D, F, or withdraw from the course).

Thinking “infrastructurally,” “The Emerging Scientist” is a first-year writing course that attempts to enhance students’ sense of belonging. It does so by embedding critical thinking, reading, and writing skills into experiential and expressivist assignments alongside process-focused assessment. Placing GenAI literacy skills in service to these broader aims may, I hypothesize, strengthen students’ motivation to not use GenAI indiscriminately throughout the writing process. This design choice opens up provocative questions for us to explore as we move forward and learn from our research study. Does a greater sense of student belonging increase students’ confidence in their writing and thinking skills? Does that confidence serve to reduce or change their reliance on GenAI? Will the increasing ubiquity of GenAI in student work spark a widescale

return to reflective and expressivist pedagogies? Are we finally on the cusp of widescale adoption of process-focused portfolios and other alternative grading systems? I argue that these kinds of questions are examples of “infrastructural thinking” because they focus on contextually-focused relationships between different infrastructural elements such as first year writing methodologies, critical thinking skills, and technology-enabled instruction. Particularly for WAC/WID designers and writing programs that steward general education writing courses, I suggest such relational questions are more generative than implementation-style questions like “how do I apply GenAI in first-year writing?”

Making Way for Deep Change

“The Emerging Scientist” is the 100-level component of a two-course intensive writing sequence. We have already piloted a 200-level companion course called “The Scientist in Society” that builds on the skills and methods students are introduced to in the 100-level “The Emerging Scientist.” To that two-course sequence, we have added a third, problem-focused course that presents students with opportunities to work in interdisciplinary teams on problems provided by real clients. We are piloting that course in Fall 2025, and have already applied for this three-course, nine-credit sequence to become a certificate in writing, collaboration, and design for science majors.

To make that expansion sustainable will require attention to underlying systems, values, and relationships. Martin (2022) emphasized that deep change occurs only when first order structural changes and second order underlying shifts in beliefs and assumptions happen together (p. 13). Since we are only three semesters into our redesign experiment, it is too early to know for sure whether these courses will result in systemic change on campus. However, we are closely following three of the guidelines that Martin argued lead to deep, second order change:

First, we are shifting our focus from practice and strategies to underlying conceptions. “The Emerging Scientist” is designed to provide core writing and critical thinking instruction in the context of enhancing student belonging. Belonging is a strategic priority on campus and has the potential to reframe for campus partners what can be achieved in a first-year writing class. If our study of the course helps us see a decrease in AI use because of students’ enhanced sense of belonging, then we also have the potential to shift attitudes and practices regarding GenAI instruction and at the general education level across campus (and perhaps beyond).

Second, we are designing long-term initiatives. Martin (2022) advised to “develop long-term initiatives that engage institutional stakeholders in sustained conversations about writing, teaching, and learning” (p. 17). The

courses we are creating for CSAM are designed to serve all their majors. We have also had productive conversations with other colleges on campus about adapting our courses for their majors. This kind of expansion presents an opportunity to shape a multi-course introduction to GenAI, presenting students with more scaffolded instructional time to get used to using GenAI in service to (rather than in place of) their learning.

Third, we are practicing distributed leadership. Martin (2022) noted that “change efforts require leadership of different types from multiple institutional standpoints” (p. 18). While my position was created explicitly to build interdisciplinary cultures, I’m merely one collaborator among many. Developing this infrastructure involves my department chair and first-year writing leadership, colleagues like Liz Martin and the many instructors who have taken up the opportunity to teach and bring their own expertise to “The Emerging Scientist” and other courses. Other important stakeholders include deans’ offices of two colleges, the College of Science and Mathematics board, the provost’s office, instructional technologists, librarians, research consultants, and of course the students themselves.

With just a year under our belts with this project, there is much left to achieve, and many more insights and processes we need to document. What I have learned thus far, and what has been confirmed by lenses provided by Chachra (2023) and Martin (2022), is that as an interdisciplinary designer I’m primarily a designer of relationships—and those relationships are profoundly informing my practice. Bringing my design work into the orbit of first-year writing has brought me closer to WAC thinking and doing. The continual encroachment of AI has prompted me to value more closely the expressivist and experiential traditions of our discipline. And being situated in a vibrant writing studies department has deepened my belief in collaborative, interdisciplinary potential.

Finally, and in the context of this profoundly unsettling period of history, most urgently: my understanding of sustainable and ethical innovation has become very much aligned with infrastructural integrity and relationships of trust. As Chachra (2023) wisely wrote:

The most radically important promise of infrastructural systems is not just that they underpin our individual agency but that they can do so in a way that is democratic and universal. Most technologies are sold on the premise of being liberatory, but infrastructural systems have genuinely demonstrated that they are. (p. 311)

The next time you read a screaming headline about how AI is going to demolish humans’ ability to think, turn off the screen. Close your eyes. Breathe. Gently

push to the side the inevitable annoyances and roadblocks caused by clunky campus infrastructure. Think instead of those instances when you and your students happen upon a joyous moment of learning and connection. Think of the times a beloved colleague had your back or inspired you to do your best work. Trust that in those moments lie the answers to what comes next.

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