

achieve high grades within more rigid disciplinary trajectories (e.g., pre-med, engineering) (Wintrol & Jerinic, 2013). Such real or perceived academic demands impede the very willingness and ability to take risks, iterate, and learn from failure necessary for students to collaborate across boundaries and address problems (McGregor, 2017). Furthermore, the COVID-19 pandemic increased students' anxiety (Liyana et al., 2021), which we have experienced exacerbates their tendency to avoid these intellectual risks in the classroom and throughout their educational trajectories.

This note describes the specific path forged by the Virginia Tech Honors College to guide students through exploring complex, transdisciplinary problems, particularly with a new Minor in Collaborative Discovery, approved in 2021. The Minor is now a central feature of our curricular approach and provides a more guided path for students to receive their Honors Laureate Diploma than our traditional individualized approach to the Diploma, which is still available to students who prefer to remain on more disciplinary-focused paths in lieu of the Minor. We suggest that the Minor is the clearest path to, instead, help them take the intellectual risks necessary to balance transdisciplinary activities with their discipline-specific demands. With this note, we present the Minor in Collaborative Discovery as a scalable curricular map for supporting students to address complex problems in their academic and professional careers, both within our own university and for other higher education talent programs.

2. The Educational Landscape

Virginia Tech is a large, public land-grant university in the southeastern United States with nearly 30,000 undergraduate students, around 7,000 graduate students, and a reputation for agriculture, engineering, and technologically focused programs. The Virginia Tech Honors College provides talented, high-performing students across numerous disciplines with an opportunity to explore complex problems and the cultural and societal implications of technology through smaller class sizes than they may typically experience. We adopt an explicitly transdisciplinary (as opposed to inter-, multi-, or cross-disciplinary) approach, which “provides a holistic intellectual framework for understanding issues and the interdependence between them” (Knox & Heilker, 2023, p. 424), by integrating diverse methods and approaches to address complex problems (Lewis et al., 2021).

A carefully curated mix of core Honors College faculty expertise supports this transdisciplinary approach, including computational biology, public policy and administration, rhetoric, geography, architecture and design, and anthropology—with many more disciplines represented by Honors affiliate faculty from across the university. Honors courses draw on faculty members' expertise to explore various societal problems, such as climate change and its inequitable impacts within communities, through diverse yet integrated lenses like environmental policy, data and social justice, and the future of employment and education (Velez et al., 2022a). Following the literature on transdisciplinarity (Knapp et al., 2019), faculty collaborate with each other and, very often, community, non-profit, industry, government, and

university partners in both their research and teaching, thereby modeling these capacities for students.

In addition to this broader university and Honors College educational landscape, we have created a Philosophy of Teaching and Learning as a navigational tool that guides students to think critically as active participants in their own learning processes as we ask them to engage in transdisciplinary, collaborative discovery and its uncertainties. This Philosophy also guides our overall curricular approach and emerges from both formal and informal assessment over now seven years since Virginia Tech Honors' shift from a program to a college (Velez et al., 2022b). This shift allowed the Virginia Tech Honors College to overcome governance, policy, and funding limitations inherent to programs within the university structure. As a college, Honors can hire faculty to design the curriculum, engage in related scholarship of teaching and learning, and provide degree options for students, all of which are geared toward supporting them in transdisciplinary collaboration around complex problems (Lewis et al., 2021).

The Philosophy of Teaching and Learning aids in that transdisciplinary collaboration. Its format mirrors the broader Virginia Tech Principles of Community (<https://www.inclusive.vt.edu/about/vtpoc.html>), which is familiar to students. As with our other curriculum work, the Philosophy is a living document, which we will iterate on and improve over time. Principles that we communicate to and aim to demonstrate for students in the Philosophy include:

- We expect the best from ourselves and our colleagues – and that includes you, our students. We invest heavily in and have high standards for our collective work, and we expect you will do the same.
- We will push the boundaries of knowledge and engage with new and challenging ideas to drive innovation. This is difficult work and requires more effort than you might initially think, and often more challenging work than you may encounter in your major.
- An honors education will require you to be a highly motivated, independent, and reflective learner, someone capable of making connections and applying yourself across disparate domains of knowledge and action. This process is individualized and requires you to play an active role in your learning.
- We care deeply about you, your ideas, and your work, and we engage accordingly. This care and respect is often expressed through feedback and critique designed to push you beyond your current limitations and encourage improvement through iteration. No matter how strong your work is, continually ask yourself, “What have I not yet considered? How could this be improved?”
- We expect that you will be strong partners in your education, asking critical, informed, and well-considered questions that will clarify and foster our collective inquiry and innovation.
- We value our diversity, our rich differences in disciplinary training, scholarly experiences, and approaches to teaching. As our partners in this transdisciplinary enterprise, you will do well to embrace this diversity as well, moving beyond a desire for single perspectives and simple answers.

Like many navigational tools that we provide as part of our learning environment, the Philosophy of Teaching and Learning provides an overarching framework that aims to clarify potential hurdles and goals for Honors students to reduce uncertainty and forge forward on their educational paths. While the Philosophy holistically aims to clearly communicate our values around collaborative discovery, we find that its principles of critique, feedback, and iteration are particularly relevant for supporting students to learn together through initial failure and ongoing improvement.

Though it is a relatively new tool, we have recently provided it to students in each of our in-Honors College courses and feature it on our webpage. As we discuss below, all incoming Honors students will soon receive more direct and in-depth exposure to the Philosophy of Teaching and Learning in a required introductory course beginning in fall 2023.

3. Follow a defined educational path or a guided trail map down a more uncertain one

The VT Honors College provides a forked path for high-achieving students to find their way and receive Honors credentials while developing capacities for disciplinary depth, transdisciplinary collaboration, systematic and iterative research approaches, and experiential learning (Lewis et al., 2021): the Honors Laureate Diploma and the Minor in Collaborative Discovery. While the emphasis on any one of those capacities will vary by student and which of the two paths they pursue, all will receive, at a minimum, an orientation to transdisciplinary collaboration through a new required Honors introductory course, UH 1404: Principles of Collaborative Discovery, which will launch in fall 2023. That course is grounded in the Philosophy of Teaching and Learning and includes the following specific learning objectives:

1. Compare/contrast and explain the differences among disciplinary, interdisciplinarity, multidisciplinary, and transdisciplinarity;
2. Compare/contrast qualitative and quantitative research methods and explain their uses;
3. Describe “wicked problems,” systems thinking, and collaborative discovery and articulate the challenges and values of each;
4. Identify the major processes involved in problem analysis and design thinking;
5. Recognize the ethical dimensions of trans-sector activity.

Diverging from there, first, the standalone Honors Laureate Diploma offers students a highly flexible approach to follow their own paths around broad curricular categories of collaborative discovery and experiential learning. We expect that no two students have completed this Diploma in the exact same way. While many students opt to integrate transdisciplinary Honors core courses into their diplomas, such flexibility can also allow students to emphasize disciplinary depth, thereby minimizing their risk of wandering from their personalized educational paths. For example, students could receive many of their Honors Laureate Diploma credits through faculty-student agreements that allow them to increase the rigor or scope of existing courses, in-discipline undergraduate research, or departmentally designated Honors courses—all offered in other academic units across the university—that align more closely with

their disciplinary educational requirements. We appreciate that a more self-defined and disciplinarily bounded path is appropriate and necessary for many high-achieving students.

The Honors Minor in Collaborative Discovery, on the other hand, provides increased guidance down a structured, scaffolded, and integrated academic trail to deeply immerse students in concepts of transdisciplinary collaboration, systematic and iterative research practices, and experiential learning through Honors College core courses. Following our Philosophy of Teaching and Learning, the Minor encourages students to veer from the boundaries of their disciplinary paths to explore and evaluate complex problems across disciplines. As such exploration can engender discomfort and uncertainty for many students—especially high-achieving Honors students—the Minor provides enhanced guardrails (i.e., more required, Honors core courses focused on the above concepts) to mitigate that uncertainty for those who want to embrace the risk-taking required of transdisciplinary collaboration. Students may opt for this path as they increasingly recognize that employers seek transdisciplinary capacities and the “soft skills” in teamwork that accompany them (Hart Research Associates, 2018). Moreover, they can better prepare themselves to address the pressing societal challenges that they deeply care about and will directly impact them and their communities now and in the future.

Students who complete the Minor in Collaborative Discovery simultaneously receive the Honors Laureate Diploma. As shown in Figure 1, the Minor consists of 16 required credits, which students can take in any order but could conceivably provide a clear, step-by-step path for completion. Additionally, students select at least 8 credits from a list of Honors electives, thereby maintaining some of the flexibility offered by the standalone Honors Laureate Diploma.



Figure 1. Virginia Tech Honors College Minor in Collaborative Discovery Curriculum

All courses shown in Figure 1 are additionally available to students pursuing the standalone Honors Laureate Diploma. Instead of designating these as required and elective courses, however, the Diploma curriculum organizes these same courses into broader “collaborative discovery” and “experiential learning” categories. The *only* required course for the standalone Honors Laureate Diploma is UH 1404: Principles of Collaborative Discovery. While more required courses comparatively limit students’ flexibility and focus on disciplinary depth, students in the Minor in Collaborative Discovery instead embrace this guidance on their Honors path to mitigate the risk and uncertainty that they may experience in the unfamiliar landscape of transdisciplinary collaboration around complex problems.

4. Mapping best practices in collaborative transdisciplinary risk-taking

The curricular approach to the Virginia Tech Honors Minor in Collaborative Discovery maps a best practice for guiding students along a path to exploring complex, transdisciplinary problems. It aims to foster the iteration, risk-taking, and embracing of potential failure that informs our Philosophy of Teaching and Learning.

Additionally, we suggest that articulating a programmatic Philosophy of Teaching and Learning is a best practice in and of itself. It is especially useful in a learning space like the Minor, where students are grappling with complex materials and new expectations around collaboration, which may take them unexpectedly outside their intellectual comfort zones. While course syllabi and assignments frequently state associated learning objectives, we have found that it is less common to explicitly state the types of attitudes, engagement, and learning approaches that students should cultivate to successfully engage in a program like the Minor. The Philosophy of Teaching and Learning orients our approaches and expectations for students, provides consistency across faculty and courses, aims to minimize uncertainty, and communicates that we as faculty are engaged with students in their learning journeys. The College-wide exposure to the Philosophy of Teaching and Learning beginning in fall 2023 will allow us to assess its resonance with students. We hope this assessment will also allow us to better understand the barriers to risk-taking for all Honors students and particularly those who opt to remain on a more discipline-specific path with an individualized Honors Laureate Diploma as opposed to the Minor.

Though the Minor in Collaborative Discovery is relatively nascent, our previous assessment strategies suggest this approach will provide the guardrails for high-achieving but risk-averse students to step out of their disciplinary comfort zones and collaborate with others. With the upcoming inclusion of the required introductory course and SuperStudio courses providing a pseudo-culminating experience, we plan to expand our current learning outcome surveillance assessment to formatively and summatively assess student, faculty, and trans-sector partner outcomes around our Philosophy of Teaching and Learning and the Minor's learning goals. While more formal assessment is forthcoming, this note maps a burgeoning and scalable potential path for other Honors and higher education talent programs to similarly guide their students to take risks and explore complex problems.

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