Teaching Systems Thinking in a Global Classroom:

Lessons from an International Faculty Collaboration

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Abstract

As higher education seeks to prepare students to navigate complex global challenges and define its purpose in an era of AI, systems thinking has emerged as a core competency for learners. This paper reflects on six years of collaborative teaching between faculty from polytechnics in Canada, New Zealand, and Denmark that took place in an online environment. Through interdisciplinary teamwork on research projects that use systems thinking concepts and tools as a way to understand complex issues, students from these three countries work together across time zones, cultures and disciplinary boundaries to explore issues that they are passionate about. These students were mentored and supported by a group of faculty who have collaborated for the past 6 years to create this virtual learning opportunity. Drawing on the faculty's reflections, we collectively examine how systems thinking functions both as an analytical framework and a pedagogical practice in our international, online classroom. Our analysis highlights a central insight: While systems thinking emphasizes connections within complex systems, effective pedagogy in such contexts depends on connections as well, in particular relationships. Trust, empathy and sustained personal engagement emerged as critical conditions that enable meaningful collaboration, which further enables deep learning. This paper contributes to the discussions on systems-thinking and systems-change education by proposing that relational dynamics (relationships) can be understood as a pedagogical leverage point in systems education, not just an interpersonal benefit. Learning and integrating indigenous knowledge that centers interconnectedness and responsibility can also deepen systems pedagogy and strengthen collaboration in learning initiatives with learners and faculty from diverse locations, disciplines and backgrounds.

Introduction

We live in a dynamic and ever-evolving world, where ecological, socio-political, and economic crises increasingly shape our lives, demand ever more rapid responses, and AI unsettles established approaches to, and assumptions of, education and knowledge. In this context, higher education—and specifically polytechnic education—is tasked with developing future-oriented pedagogies that build students' capacity to act with critical insight, empathy, values, and deep awareness of interconnectedness. This paper shares the experience of the Global Polytechnic Alliance's (GPA) Collaborative Online International Learning (COIL) project as one such pedagogical case. In this inter-institutional initiative, systems thinking, teamwork, and interdisciplinary, international collaboration provide a framework for exploring complex global issues and reimagining how they could be addressed. Focusing on systems thinking as the key conceptual lens for escaping siloed modes of thinking in the face of complex global crises, the paper examines how this framework has been applied in the GPA COIL. Systems thinking is an analytical approach that emphasizes understanding how elements within a system interact and influence one another over time, rather than examining problems in isolation (Meadows, 2008). The COIL brings together faculty and students from four affiliated institutions: VIA University College (Aarhus, Denmark), Humber College (Toronto, Canada), Otago Polytechnic (Dunedin, New Zealand), and, for the past two

years, Georgian College (Barrie, Canada). GPA faculty co-design and co-teach an eight-week course that mentors interdisciplinary student teams across continents, time zones, and cultures to use systems thinking in order to understand and map complex global problems they care about.

We explore the lessons of this international virtual collaboration for systems learning, particularly the imperative of understanding interconnectedness to navigate complex global issues. Specifically, we ask: how does international virtual collaboration shape the teaching and learning of systems thinking in polytechnic education? Our reflection reveals an important layer: The analytical power of systems not only serves as a powerful pedagogical approach; it also mirrors why this project has been able to thrive, namely, the strong relationships among faculty and students. These relationships prove crucial both for understanding complex issues and for enabling diverse teams to collaborate effectively to learn about them. The GPA COIL experience thus reinforces the value of systems thinking for understanding global complexity while also highlighting its limitations, particularly its tendency to emphasize abstract connections rather than the relational dynamics that enable collaboration and learning in practice.

This case reflection concludes with insights on the experiences of students and faculty in the GPA COIL project, highlighting the power of systems thinking to enhance future-oriented pedagogies, alongside lessons our project may hold for similar initiatives that seek to build networks across geographical and institutional boundaries to create education for tackling global challenges. Recognizing parallels with Indigenous ways of being, knowing, and doing, we suggest that there is significant potential to further develop a theoretical framework for pedagogical approaches that center the role of relationships. Thus, this article seeks to contribute to the literature on systems thinking pedagogy by showing that relational dynamics—trust, empathy, and sustained collaboration—function as a critical pedagogical leverage point in international virtual learning environments.

Teaching Systems Thinking through International Virtual Collaboration

COIL projects are part of the *Internationalisation at Home* movement, which considers the importance of globalisation and learning abroad programmes (Beelen & Jones, 2015). However, historically, only very privileged students had the means to gain international education through travel experiences (Rodriguez, 2011). In our setting, a virtual online classroom brings students and faculty together across countries, cultures, and disciplines to learn systems thinking, build community, and work collaboratively to research complex challenges. Students come from diverse disciplines, including marketing, design, social work, social entrepreneurship, addictions and mental health, international development, and business, among others, and from different credential programs (diploma, degree, and postgraduate).

What we did: From January to April each year, students from each institution joined weekly online workshops over 8-14 weeks and selected general areas of interest for systems thinking application. Students were grouped in teams of three to four, each with representation from at least two institutions. Two online sessions were held weekly: one with the entire cohort to learn the systems thinking framework and another in their groups with a supervising staff member to dive deeper into their chosen research project and framework application. A third weekly session, not visible to students, brought faculty together for a structured debrief. In this space, instructors reviewed student learning, reflected on pedagogy, and shared lesson insights while also cultivating deeper professional relationships. These interactions extended beyond coordination, fostering trust, mutual understanding, and relational depth that mirrored the very systems thinking principles being taught. Students always select a broad range of social and economic issues reflecting their professional or personal engagement and passion—ranging from food price inflation, housing shortages, cybercrimes, and the global sand shortage to loneliness in aging populations and mental health challenges facing international students. Regardless of students' level of study or research topics, GPA participation provides essential employability skills and competencies, including systems thinking, global awareness, collaboration, and critical thinking—all 21st-century skills crucial for sustainable development (Rieckmann, M. et al., 2017). Student research outcomes are compiled and submitted to Map the System, a global competition organized by the Skoll Center for Social Entrepreneurship at Oxford University. This is the context in which our COIL Map the System teaching project has been carried out over the past six years.

Uncovering Complexity through System Thinking

In this section, we will discuss two systems thinking tools that have proven effective in supporting students' early engagement with systems thinking. Students are asked to explore system thinking tools prescribed by the Map the System global competition and in particular the Iceberg Model and Connection Circle play key roles in navigating students to engage with complex research topics.

For example, the Iceberg Model was instrumental in uncovering the systems surrounding food cost inflation in New Zealand. Students selected this project with the assumption that the inflation was connected to the Ukrainian war and food shortage. However, New Zealand produces a large amount of food locally, but the inflation was connected to systemic structures of supermarket duopoly. Mental models surfaced that food prices are a part of the capitalist economic model, rather than part of the national social service. Using systems thinking and the Iceberg Model, a simple observation of everyday food prices extended students' learning from national agricultural production to the politics of duopoly, the economic model, and social inequity. In this case, the Iceberg Model enabled analysis beyond surface observations by structuring inquiry across four levels: Observable events, patterns and trends over time, underlying system structures, and the mental models—beliefs and cultural norms—that sustain those structures, in this case, sustaining the food cost inflation.

The Connection Circle tool was applied in a student project examining loneliness among older adults. The visual mapping helped identify interconnected groups—including neighbours, family members, mental health professionals, and educational institutions—and overlaying points of interaction with people through digital platforms, physical spaces, and both planned and informal encounters. By framing these elements as an interconnected network rather than isolated groups, the tool revealed reinforcing patterns that can intensify experiences of loneliness or act as lever for positive change.

These examples demonstrate how systems thinking tools challenge assumptions and biases, preventing jumping to immature concepts about how to fix the world. Instead, it broadens perspectives, reveals interconnected system dynamics, and enables students to identify leverage points for positive change. In some themes, students position themselves within the system, thereby instilling agency. This approach aligns with the original objective of the Map the System competition (Map the System, n.d.), which seeks to move beyond heropreneurship and solution-based project outcomes toward a deeper understanding of complex problems. In addition, systems thinking offers visual analysis tools, enriching learning for students with diverse learning and language preferences . Having taught visual thinkers and students of a range of English language competencies, it has become evident that systems thinking offers a breath of fresh air to analyze complex academic issues through visual tools and support thinking by doing—drawing diagrams and physically connecting dots and elements on large paper or digital mind map tools.

These observations underpin the importance and usefulness of systems thinking in polytechnic education that strives to provide learning opportunities for learners with different learning styles, language competencies and neurodivergence. Furthermore, beyond its usefulness as a final project presentation and assessment format, the system thinking maps offer a starting point for engaging conversations, throwing around thoughts, and trying out different ways of connecting complex elements with team members. Using digital platforms such as collaborative mind map tools and canvases can offer important starting points to accelerate conversations between students, and between students and faculty members, thus providing opportunities for richer interactions and relationship building. The next section will give focus to relationships and relationship building that prove central to meaningful learning experience.

Relationship Building as a Central Component of the GPA COIL

A central part of our GPA COIL project is intensive group work. During the pandemic in 2020, students described trust, kindness, and respect as "unintended gifts," forming deep friendships while seeking connection in a time of isolation. These experiences suggested an important pedagogical insight: the effectiveness of systems thinking education in international virtual settings depends heavily on the quality of the relationships among participants (Block, 2009). This reflection emerged from that global lockdown period, when tertiary students longed for social interactions, purpose, and belonging—having more time but less freedom (McCaw et al., 2021).

Six years later, the context has shifted: Students now juggle far greater commitments across their virtual and physical worlds. Balancing in-person and online classes, paid work, and digital distractions makes full commitment to online learning harder. Virtual collaboration feels fleeting—once the "Leave" button is clicked, the team, course, and everything disappear. As the term "ghosting" suggests, it is easy to vanish from online relationships without the serendipity of campus encounters. These experiences reveal a key shift for COIL and online education: Effective learning in international virtual classrooms cannot be transactional or reduced to a linear progression through content. Relationship building must be prioritized as the foundation of meaningful engagement. Our experience shows trust and human connection are not peripheral; they are essential for successful collaboration and transformative learning. From the start, our faculty team role models this through trust, open communication, and warmth, paired with debrief sessions where students could share thoughts and emotions anonymously, if desired, feeling validated and valued.

Creating space for collaboration beyond task completion proved key to embracing cultural diversity, navigating time zones, and differing academic norms while building critical interpersonal skills. These challenges are not novel—studies confirm students from varied backgrounds bring different skills, habits, and priorities that shape their work (Doukanari et al., 2021). Inquisitive relationships helped teams thrive under pressure; conflicts offered lessons in negotiation, accountability, and resilience. In both cases, the relational dimension shaped how students connected, collaborated, and grew—not just as learners, but as global citizens. When the United Nations highlights global collaboration as central to the future of work, the importance of relational, cross-cultural collaboration in student learning takes on urgency (Rieckmann, M. et al., 2017). Fostering inclusive mindsets through collaboration develops leaders for complex challenges. In our polycrisis era, these skills—deep listening, empathy, curiosity, shared purpose—are essential. COIL becomes a vehicle for meaningful layers of learning, enabling students across disciplines, institutions, cultures, and geographies to interact, collaborate, gain agency, and own their learning. The project underscores that relationships are not incidental to online learning—they are its core. This invites us to redesign virtual education not as content delivery, but as safe spaces for human connections fostering knowledge exchange and unmeasured interpersonal growth.

Systems Thinking and Relational Pedagogy: Reflections on Future-Oriented Pedagogy

Systems thinking is not without a gap; there is a distinction between a "connection" and a "relationship." Systems thinking tends to treat connections as flat, two-dimensional links—positive or negative—within causal maps. These can seem transactional in explaining a circumstance or situation. While useful for mapping complexity, this approach overlooks the depth and nuance of relationships. Relationships are multidimensional, shaped by trust, power, emotion, embodied experience, and context. They span roles, identities, environments, and evolve. Unlike

simple connections, relationships carry meanings and influence behaviours in ways systems thinking does not fully capture.

Over six years of teaching systems thinking collaboratively, we found that strong relationships among faculty were as critical as understanding systems themselves. What might appear in a systems map as a set of connections was, in reality, a network of evolving relationships shaped by trust, shared experience, and community. These relational dynamics added layers of meaning and influence absent from the flat, transactional links typically depicted in systems thinking models. Similarly, student learning flourishes where relationships are nurtured. Teaching effectiveness and engagement correlate strongly with the quality of these interpersonal ties

The GPA COIL insights suggest a relationship-centered perspective can enrich both systems thinking and pedagogy. Indigenous knowledge systems, which emphasize "all my relations", remind us of depth's importance in understanding. Unlike surface-level digital connections, meaningful relationships foster understanding and reciprocity. Mātauranga Māori, the Indigenous knowledge system of the Māori people in New Zealand, exemplifies and reinforces holistic connections between people, land, and sea. This perspective challenges the Western academic tradition, which often isolates issues and relies on compartmentalized methodologies, pointing toward more integrated ways of knowing. Scholars like Melanie Goodchild (2022) advocate decolonizing systems thinking through relational approaches—a crucial direction for reimagining complexity and coexistence.

Conclusion

This GPA COIL case reflects on our practices—systems thinking, intensive group work, faculty relationship-modeling—revealing relationships as the true leverage point for future-oriented pedagogy. Systems thinking offers powerful tools to map complexity, challenge student biases, and prevent quick "fix the world" solutions. Yet the GPA project, as a microcosm of today's interconnected challenges, shows that collaboration across time zones and disciplines demands more than virtual connections. Deep, meaningful relationships form the bedrock of sustained growth and success, enabling us to navigate cultural complexities, break siloed mindsets, and build common solutions.

We have discovered learning here is ongoing—requiring continuous adaptation through challenges and insights from each other's diverse perspectives. Faculty relationships undoubtedly supported student growth, though we question if this alone consistently creates meaningful educational experiences. Trust proves essential during breakdowns; without relationships, frameworks crumble. We learn best relationally—with each other, the land, and non-human kin—as Indigenous paradigms affirm.

This reinforces our conviction: significant work remains to equip ourselves and students for complex futures. We must critically re-examine our practices—including "newer" systems

thinking approaches—and recognize that teaching occurs within changing educational systems, student realities, and global circumstances. Embracing Indigenous worldviews that honour all things' interconnectedness, and decolonizing our own practices, is essential for pedagogies contending with this deeply interconnected world's messy realities.

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