



**Laidlaw Scholars Undergraduate Leadership and Research
Programme
Research Report**

**Beyond Boundaries in Transnational Planetary Health Education:
Evaluating Pedagogy for Systems Thinking and Movement Building in
Higher Education**

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Abstract

Transnational education, or learning that occurs in collaboration between two or more countries, provides a unique opportunity for students to consider systems and movement building skills from different perspectives. As the interconnection between environment and human health becomes paramount, so does the need for planetary health education. Building on Guzmán et al. (2021)'s framework for planetary health education, this research investigates how a transnational classroom in a planetary health course co-developed by Moi University (Kenya) and the University of Toronto (Canada) can support student systems thinking and movement building skills. Through focus groups and key informant interviews with educators, this research report finds that peer discussion, reflective activities, and meaningful guest lectures by lecturers active in the planetary health movement can inspire planetary health action and behaviour change, as well as a transformation in how students view their own personal power.

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1.0 Introduction

In 2021, 6.6 million people died from ambient and household air pollution (World Health Organization, 2024). As of 2023, 99% of the world's population breathe air that exceeds the safety limits of the World Health Organization (World Health Organization, 2024).

To discuss breath is to discuss life: not only that of human beings, but that of all beings. The butterfly, *memengwaa* in the Ojibwe language, sucks air in not through lungs but through small holes, or spiracles. Those spiracles open into tubular tracheae within their tiny bodies, absorbing oxygen and powering flight. The mugumo or strangler fig tree is a singular immensity towering over the forest canopy, breaking down carbon dioxide for growth and releasing oxygen. Microbes duplicating in rushing rivers and cloistered forests, invisible to human eyes, depend on oxygen to decompose fallen leaves. These beyond-human beings, in turn, implicate other beings and systems. Living things depend on microbial decomposition to recycle nutrients to be reused. 75% of all food crops rely on pollinators, of which the butterfly is one of many (Timmins et al., 2024). Mugumo trees are sacred to the Kikuyu people and have bark that can treat stomach illnesses (McConnell, 2020).

Today, climate change serves as an urgent reminder of the ways in which the environment twines inextricably with well-being. In 2023, scientists announced that we had surpassed six of the nine planetary boundaries necessary to keep Earth stable (Stockholm Resilience Centre, 2023). In 2025, we surpassed a seventh boundary. We face an ever-compounding health crisis that is ecological in nature and points to the importance of the field of “planetary health”. First explicated in academia as the achievement of “the health of human civilization and the state of the natural systems on which it depends” (Whitmee et al., 2015), it has also been described as a “transdisciplinary field and social movement” (Planetary Health Alliance, 2025) aimed at addressing the environment's effect on Earth's life.

At present, the education system often fails to address the crisis of our environmental and anthropocentric context (Baena-Morales and Fröberg, 2023). For example, scholars have called for the integration of systems thinking, experiential learning, and multiple ways of knowing into planetary health pedagogy (Davidson, 2025). Experiential learning can combat eco-anxiety and train students to build movements for planetary health. Meanwhile, to open up to multiple ways of knowing is to embrace the many frameworks that center connections between human health and the environment. This includes One Health and Indigenous paradigms, which, built upon the idea of shared human-land wellbeing, can train students and educators to realize new approaches to the problem of planetary health. In this area especially is planetary health education lacking: when educational frameworks were reviewed, few explicitly featured Indigenous ways of knowing (MacKenzie-Shalders et al., 2023).

Building on the Planetary Health Education Framework (Guzmán et al., 2021), this study evaluates the current state of planetary health education for two of the foundational domains identified: systems thinking and movement building. Systems thinking refers to the ability to consider the relationships between health and environment “at different geospatial and temporal scales” (Guzmán et al., 2021) and in “complex, adaptive systems” (Guzmán et al., 2021).

Movement building, meanwhile, depends on student capacity for “transformational partnerships” (Guzmán et al., 2021) and communication to engage with and change systems.

Higher education institutions play a critical role in informing advocacy and policy through meaningful planetary health education and research. In this research, I investigate how pedagogies in higher education effectively teach students to build movements and participate in systems thinking. This research contributes to scholarship around education reform for advancing planetary health action in the unique environment of the transnational classroom .

2.0 Methodology

2.1 Literature Review

A rapid review of planetary health education in higher education was conducted. The search strategy, designed in collaboration with a public health librarian, used a combination of terms relating to planetary health and terms relating to post-secondary education. Two databases were used for this search: Ovid MEDLINE and Education Source. Only articles published in English were included, but no restrictions were placed on time or location. More details on the terms used can be found in Appendix A.

Abstract inclusion criteria were as follows:

- Abstracts stating that student response to a tertiary education intervention were included
- Educational interventions focused solely on one aspect of planetary health, without reference to its broader implications, were not included.

Full text inclusion criteria were as follows:

- Texts that either evaluated or provided results on student capacity for systems thinking, professional or personal behaviour change, or movement building were included.
 - Ability to define planetary health was not considered sufficient evidence for systems thinking.
 - Evidence of movement building included student networking and project leadership.

2.2 Teaching Intervention: Planetary Health Course

The virtual, 12-week course Planetary Health was co-developed by faculty at Moi University in Kenya and the University of Toronto in Canada. It is offered at the University of Toronto as a graduate-level credit course and at Moi University as a certificate course. No prerequisites are required, and it is open to all students. At Moi University, it is also open to faculty. More recently, it has also become available at the University of Eldoret.

Systems thinking was threaded through the course and its concepts as a whole. For movement building, however, students were introduced to ways that they could take an active role in planetary health. For example, three different guest lecturers, who came to Canada and Kenya, delivered lectures on what community engagement could look like. Additionally, students completed a food, water, and energy diary to track their resource usage.

2.3 Student Focus Group Discussions; Key Informant Interviews

Past students from the course and certificate course Planetary Health, co-developed by the University of Toronto and Moi University, were invited to join focus groups to discuss their experiences in the course and how their approaches to systems thinking and movement building were shaped. Faculty who have taught in fields around planetary health were invited to separate interviews focusing on what pedagogies support student movement building and systems thinking.

10 students from Moi University joined two focus groups. 6 students who took the course through the University of Toronto joined interviews, as due to scheduling difficulties focus groups were not possible. One student who took the certificate program offered by Moi University could not join the virtual meeting room for more than a few minutes at a time, and was unable to join the conversation.

4 faculty members from the University of Toronto took part in interviews, while 3 from Moi University took part. Faculty from the University of Toronto who joined came from the School of Environment, Institute for the Study of Education, and School of Public Health. Faculty from Moi University came from different divisions of the School of Public Health.

All interviews and focus groups were held virtually and transcribed using Zoom's transcripts, or, in some cases where transcripts were unavailable, using Microsoft Word's transcription tool. Focus groups lasted for up to 90 minutes, while interviews lasted up to 45 minutes. Students who joined the sessions were provided with \$15, or 1,356 KSH, as compensation. All analysis was done using NVivo and Braun and Clarke's framework of reflexive thematic analysis, with Olmos-Vega et al. (2022) and Byrne (2021) serving as examples and guides. Much of the analysis is a truncated version of Olmos-Vega et al. (2022)'s approach, due to the constraints of the six week research period.

First, the Zoom transcripts were copied into Word documents. I listened back to each interview and focus group, editing any mistakes in the transcripts as I listened. I then made preliminary codes through comments on Word.

Coded data items were reviewed and the codes of different papers compared in order to generate themes. The approach to developing themes partially inductive and partially deductive: the main themes were set to be movement building and systems thinking, but I remained open to other major themes that would develop from the data and subthemes were developed deductively.

Transcripts were then coded in NVivo, and the codes and themes reviewed before being finalized.

3.0 Results

3.1 Literature Review

The Prisma diagram of the literature review can be found in Appendix B.

A. Simulations and Roleplay

Simulations and roleplay can generate meaning through the active, real-life application of knowledge. That meaning, as seen in Amberger et al. (2026) and Mainey et al. (2024), can take the form of student empowerment, or their belief in their ability to have an impact on climate

action and politics. Mainey et al. (2024)'s approach is notable for its use of 'sequential simulations' that included simulation of political action.

Simulations also contribute toward systems thinking skills by developing knowledge about the varied systems creating the health challenges faced today (Acosta et al., 2024; Shearer and Kniel, 2026) and for cross-disciplinary collaborations (Chiu et al., 2019). Three of these interventions used role play, for example as government figures from a country in a health crisis (Acosta et al., 2024). Shearer and Kniel (2026) took the unique approach of implementing a simulation where students attempted an escape room-based activity. All of the interventions included the delivery of background information to learners, whether that was through an introductory lecture or whether the simulation was delivered in the context of a course where relevant planetary health information had already been taught. Chiu et al. (2019), for example, delivered a workshop session with didactic, multidisciplinary lectures followed by a simulation of a public health emergency where students had to use a budget on tests to understand the emergency causes. However, despite the increase in self-rated knowledge about collaborating between disciplines, they found no significant increase in the perceived importance of cross-discipline collaboration, as the pre-test median of the importance of collaboration was already 10/10.

Two papers discussed the use of simulations and role play as part of a larger course (Amberger et al., 2026; Habermehl et al., 2026). Both of these interventions used role play simulations for students to experience different situations they would face in their roles as healthcare professionals. Though both had positive impact on student systems thinking skills, it is difficult to isolate the specific role of simulations from the impact of other course elements.

B. Learner Discussion and Critical Engagement

Several planetary health courses, as well as some workshops and individual activities, included elements designed to encourage critical thinking. This often occurred through discussion activities, which formed important components of courses. Though this was mostly achieved through individual discussion activities, Amberger et al. (2026) employed a 'flipped classroom' approach where class time was made up mostly of student discussion. Their explicitly transformative teaching approach increased student sustainable behavior and self-faith in climate protection capacity.

Critical engagement activities often formed around questions as a prompt, for example through small group problem solving, class debates, and open Q&A sessions (Merduaty et al., 2025; Uehlinger et al., 2019; Valentine et al., 2015; Vicente et al., 2022; Visioli et al., 2022; Widmann et al., 2026). While the effect of these interventions on students cannot be isolated from the course at large, several studies discovered that students sought future collaborations with each other (Valentine et al., 2015; Vicente et al., 2022) and others found that students integrated planetary health related concepts into their decision making and patient care as healthcare professionals (Uehlinger et al., 2019; Visioli et al., 2022). One of these was a One Health Leadership Experience event (Uehlinger et al., 2019) and the other a Nutrition, Health, and Sustainability course (Visioli et al., 2022). Additionally, Merduaty et al. (2025) mentioned that the debate, as well as a Photovoice activity, were particularly effective at prompting deeper engagement with different planetary health perspectives.

Two courses approached student discussion by incorporating a journal or book club (Habermehl et al., 2026; Vicente et al., 2022). Vicente et al. (2022) received positive feedback on them for their group-based and synchronous implementation in a virtual course.

Individual workshops and course activities also used discussion to enhance student takeaways (Oljans et al., 2025; Stevens et al., 2024; Uehlinger et al., 2019). These discussions focused on what the knowledge gained meant for students more personally. Stevens et al. (2024) used discussion to focus on themes of emotions, vulnerabilities, and responsibilities, while the discussions used in Uehlinger et al., (2019) were an opportunity to reflect on One Health leadership.

C. Hands-On and Action Learning

Action based learning focuses on teaching students skills for their professional roles. In the following papers, it is shown as a component not only of developing professional skills but also student networks and systems thinking.

Two articles described the inclusion of laboratory assignments in intensive summer programming, with Schwind et al. (2016) describing laboratory projects and Valentine et al. (2015) teaching laboratory skills. Both articles also evaluated the program's impact on student action, finding that a minority of students maintained networks in the field of study.

Four interventions directed toward medical students incorporated planetary health action learning into their role as doctors. Marwah et al. (2024), for example, integrated planetary health skill workshops into the advocacy program of their pediatrics residency program, including a workshop on writing climate related clinical narratives and one on how to approach the discussion of environmental health factors with patients. Others introduced planetary health topics through patient case analysis that focused on care-associated emissions (Brar et al., 2025) and environmental impacts on health (Ramkumar et al., 2021; Zandavalli et al., 2024). Evaluation of these interventions mostly focused on the intervention's impact on the students' sustainable practices in their healthcare professions, with generally positive results. Zandavalli et al. (2024) found some qualitative evidence of potential student action, as students recognized their capacity to contribute to systemic changes.

Another way that action learning was provided for students was through field experiential learning (Habermehl et al., 2026; Ssekamatte et al., 2022). Habermehl et al. (2026) elaborated on these experiential learning components, which included field visits to explore environmental health in the meat and mining industry setting and clinical integrations. These experiential activities were identified by students as one of the most impactful aspects of a course and useful for understanding the planetary impact of the visited industries (Habermehl et al., 2026).

A final example of action learning comes from Ruiz de Castaneda et al. (2018), where select students of a Massive Open Online Course were given grants to participate in a five-day program. In groups, learners selected projects from their own pitches, produced research deliverables, and are reported to be continuing work on their projects beyond the program.

D. Theoretical Scenarios and Case Studies

When used as interventions, case studies often served to relate planetary health to the future workplaces of students (Álvarez-Nieto et al., 2024; Clery et al., 2021; Oljans and Mickelsson, 2025; Park et al., 2023; Uehlinger et al., 2019). Consequently, evaluators found that participating students applied more sustainability principles in their nursing practice (Álvarez-Nieto et al., 2024) and tried to lead projects based on what they learned (Clery et al., 2021).

Álvarez-Nieto et al. (2024) specifically enhanced the impact of their case studies using augmented reality technology, though they faced difficulties in adding case studies into an already full syllabus. Case studies also acted as a microcosm to show how societal and climate-health factors intersect and act on each other (Oljans and Mickelsson, 2025; Park et al., 2023).

Several case study activities touched on the relevance of the study beyond the immediate classroom and discipline by collaborating with other school divisions and inviting learners from different backgrounds. The interprofessional case study described in Park et al. (2023) was the result of collaboration across multiple University of Illinois colleges and a community public health organization. Similarly, Oljans and Mickelsson (2025) reported on a case study activity that brought interdisciplinary students and educators into the same room. Other case study interventions were specifically rooted in and drew on the local context and needs (Clery et al., 2021; Oljans and Mickelsson, 2025).

Uniquely, Stevens et al. (2024) presented planetary health case studies to medical students through a card game showing the social and health effects resulting from climate change. Yet while students reported thinking more about sustainable actions they could take, they also felt more despair and that their individual actions were not meaningful. Of related note is Álvarez-Nieto et al. (2024)'s findings: despite increased sustainability in workplaces over the course of nursing students' four-year degree with health and sustainability scenarios, and nonsignificant increases in willingness to challenge unsustainable workplace practice, students also demonstrated decreased sustainability in their personal practices and a statistically nonsignificant increase students' sense that they could not challenge unsustainable workplace practices.

E. Learner Centered Learning and Leadership

Learner centered learning refers to the pedagogical approach of centering student autonomy and power in their education.

Chiu et al. (2019) evaluated a workshop that was fully led by the student chapter of the Wildlife Disease Association, while other interventions invited student co-creation (McKeown et al., 2025; Merduaty et al., 2025; Widmann et al., 2026) to the course or course components. In some cases, students led the development of the activity (McKeown et al., 2025) or co-created a final participatory workshop (Widmann et al., 2026). In another, students took part in course evaluation before it was released (Merduaty et al., 2025).

Learner centered pedagogies also manifest as student agency over presentations and projects (Clery et al., 2021; Habermehl et al., 2026; McLean et al., 2022). Student agency was promoted through allowing them to choose their own project topic and develop their project trajectory (Habermehl et al., 2026; McLean et al., 2022) and encouraging them to apply their knowledge in post-course projects (Clery et al., 2021). Support for these post-course projects was provided through connecting students to teaching fellows and doctors who had volunteered to act as supervisors.

F. Summary

In summary, this rapid review has found that pedagogies focused on deep theoretical engagement and active student roles academically and professionally can effectively build systems thinking and movement building skills. Literature is lacking perspectives from the social science and humanity disciplines and geographically from Asia and Africa. Additionally,

few of these papers investigated movement building as an outcome, or delved deeply into what specific activities bolstered systems thinking skills.

3.2 Student Focus Groups and Interviews

An important note: while speakers will be identified as “Kenyan Learner” or “Canadian Learner” for clarity, this refers only to the location of the institution where the speaker took this course. Several have backgrounds from countries outside that of the institution.

A. Systems Thinking

I. Broadening Systems Thinking

Systems thinking plays a crucial role in planetary health progress by enabling understanding of the complex systems shaping environment-health linkages. After this course, students considered more planetary health systems, from the perspective of multiple disciplines.

Students grasped the central planetary health concept of the health-environment relationship. Initially, some learners only understood “planetary health” through the lens of health or the planet, but the course created opportunity to consider how environmental and social factors affect well-being. Walking away from the course, one student noted:

“When you touch environment, you are touching health, we’re touching animals, we’re touching human beings.” (*Kenyan Learner*)

Several students found learning about new frameworks, such as One Health and Eco Health, useful for approaching systems thinking. One student noted that they applied the One Health framework in their professional projects when analyzing the perspectives of different stakeholders:

“That’s usually what I take away to help organize my thoughts. Like whenever I have a project in front of me, and trying to think of all of the different stakeholders or all the different impacts relevant to whatever outcome I’m studying or assessing.” (*Canadian Learner*)

The transnational classroom also played an important role in supporting learner systems thinking in a globalized world. Several learners pointed to discussion between students as the crucial factor for facilitating this transnational exchange of perspectives, emphasizing the universality of planetary health and the importance of transnational responses:

“I also learned that climate change, it’s not only affecting us here only in Africa, but it’s a national... pandemic, and now it requires a transnational approach, in that we need to collaborate between the nations, just like we are doing. We are learning together.” (*Kenyan Learner*)

For some Canadian students, these discussions encouraged deeper thinking about their access to resources and relationship to nature.

“They [referring to some Kenyan peers] have to walk to [...] carry the water. So it would be a waste of their like... pure water to use it to shower every day. So that’s like something we take for granted in our ecosystem where we have it on tap. (*Canadian Learner*)

II. Re-evaluating Relationality

Student relations with both other people in the classroom and nature at large grew.

Learners developed a deep recognition of the environment as an immense presence both around and within them. This relationality with nature often took the form of interreliance and went beyond anthropocentric worldviews, ultimately reshaping learner perceptions of themselves.

One form of connection with nature came through environmental health factors and the reciprocal relations that come from taking care of nature. This recognition of land-human

interdependence fundamentally changed what students viewed their role in the world to be, with many seeing themselves as part of nature. One learner, reflecting on perspective, took it a step further to action:

“So the interdependence in the end, kind of gets to at least improve one area of the system, which also leads to another improvement in another area of the system, even though you didn't think it would.” (*Canadian Learner*)

Several Canadian students noted that conversation with Kenyan students played a role in reshaping perceptions of their own relationships with land, due to many Kenyan students “very embodied” experiences living off the land. Another, though they already felt interconnected with nature, found that it was the guest lectures that furthered this interconnection by bringing to light ways to incorporate an interconnected perspective into their professional work.

Beyond relations with nature, however, learners also reflected on the impact of their relationality with other people in the course. One learner saw the course as a culmination of systems interreliance between class peers and the people of the future:

“It does dawned on me... recently that... just through these courses we're doing that... we rely on each other in mutual benefits. And perhaps if we don't really take good care of what we are doing... in our actions on this world, then... we'll definitely suffer in future.” (*Kenyan learner*)

The recognition of relationality in the course, with the learner community and guest lecturers who acted as role models, also sparked climate hope.

“I was with a group of people who had the same vision, or had at least similar visions or ideas about... what can be done [about climate change]. And so that really, really soothed, I guess, soothed a lot of my, a lot of my fears and a lot of my anxieties.” (*Canadian Learner*)

III. Responsibility

Students discussed their cognizance of personal and human responsibility for climate change. Several pointed to the importance of the 24-hour food, water, and energy journal in recognizing the climate impact of their day-to-day lives. One noted that land-based learning components “incentivized you to go out and think about the world around you, and kind of what you were seeing and your role in it.” (*Canadian Learner*)

IV. Resituating Personal Power

Course knowledge production resituated power for climate action into student hands. In this context, knowledge of personal environmental impact was produced in collaboration and in relation to other students, guest lecturers, and community partners.

Community role models, in the form of guest lecturers and examples of community-based organizations, created a way for students to envision what their planetary health role could be. Other activities, such as the food, water, and energy journal, also centered the power of student's daily individual actions. Weekly reflections, which asked students to take a photo in nature and describe what they hoped to see for that place in 700 years, evoked reminders of our individual roles:

“Yeah, you're thinking about the future and what you hold and how much power you hold as an individual to try your best to make sure that the world that you're living in at least stays the same or better for someone who is coming up 700 years.” (*Canadian Learner*)

Ultimately, students were able to apply course knowledge to their community and themselves by pushing for professional projects attuned to environmental health factors and making more sustainable choices. The theoretical knowledge and recognition of systems linkages offered by the course was a pathway for student action and community education:

“It [the course] enables me to make better choices, including my usage of plastic and how I dispose it, how I dispose medicine as I work in the... in the... in the hospital, and just be more sensitive to cleaning the environment.” (*Kenyan Learner*)

B. Movement Building

I. Behavior Change

Behavioral changes were made in both personal waste production and professional roles. The transnational classroom, and resulting systems thinking skills, played an important role in that change, as it made students more aware of their impact beyond what was immediately visible:

“I’m less likely to purchase it [speaking generally about items that create waste], because I recognize that the garbage and the waste from those projects products might wind up somewhere else, and it might become another person’s burden, and likely someone who is much less fortunate than I have ever been.” (*Canadian Learner*)

II. Future Directions

Some students discussed the role that the course played in shaping what they envisioned future work to look like, both academically and through planetary health action. For example, one learner discovered inspiration for future research topics through the course’s supplementary readings. This learner had also applied to a planetary health training program, seeking a community like that in the course to work with toward further planetary health competencies.

Course knowledge about climate solutions and action also served as impetus for future action:

“So just knowing, I think, is the first step and also provides a lot of self-assurance in being able to kind of move forward and contribute when I-- I really, once I graduate, want to get involved with something. If it’s not my career, it’s not my career. It’ll be something that I support through volunteering.” (*Canadian Learner*)

“It [the course] was really... it brought us... to a level whereby we can say, now, am I able to articulate what’s happening? And I can really know whom to... work with so that we can start acting in our small way to improve the planetary health dimensions.” (*Kenyan Learner*)

III. Building on Previous Work

CHL5433 gave several students the motivation and inspiration to continue with and deepen their engagement with their community. One noted that the lectures in the course reshaped their approach to and the topics they focused on as the leader of an environmental health school club in Kenya. Another reflected, of their role in a One Health club in Kenya:

“So, I think the next time I’ll be going there, or, like, the next time you’re having an event, at least I’ll be able to have a better language to talk to the people.” (*Kenyan Learner*)

Additionally, seeing the long term commitment of guest lecturers to the planetary health movement gave a student the hope and motivation to expand the geographic reach of a community food justice organization that they were part of:

“That motivation piece I was talking about, that, like, kind of made me want to get something going in [city]. And we have our first two workshops actually happening here this weekend.” (*Canadian Learner*)

Professional roles also operate as spaces for the enacting of change. This became evident as professional projects unfolded in their community, pushing for policy and community interventions that took a planetary health lens to the improvement of environmental health factors.

IV. Communicating Planetary Health

Students brought planetary health values and concepts into their community through discussion and education. This included family, friends, academic, and professional communities. Academically, one student discovered their confidence in discussing planetary health at seminars and fellowships. Professionally, learners raised planetary health awareness through projects and interactions with clients and coworkers:

“It has really shaped my path to my work, because now I can confidently educate the people in the community, like, about their planet, how can... how can we prevent diseases? It's by preserving our environment, that's the planet where we live.” (*Kenyan Learner*)

Students pointed to their conceptual grasp of planetary health systems and evidence as crucial for their ability to effectively raise planetary health awareness:

“I have a language, I have evidence, I... you know, I know why I can connect how less fumes in the... in the air can cause less respiratory diseases.” (*Kenyan Learner*)

V. New Perspectives

The transnational aspect of the course played an important role in expanding students' vision of what movement building can look like and respect for different methods. Like in the development of deeper relationality, class discussion was mentioned as an important facilitator of cross-cultural idea exchange:

“I got to understand that we both have our own challenges and the way that we are trying to solve those challenges are different, but the end goal is the same. Still taking care of our planet.” (*Kenyan Learner*)

Several students noted that they gained deeper understandings for how to contribute to multidisciplinary, equitable movement building:

“... How are they like organizing and fighting against what, what they're experiencing. And I think that's where you can like actually build connections instead of like that paternalistic thing of going in and like telling, telling exploited countries what to do, especially when you're from a country that has done the exploiting.” (*Canadian Learner*)

“I look at how can we cooperate as governments, to private sector communities, so that we... we have defined solutions to the issues of climate change and Planetary Health.” (*Kenyan Learner*)

Through the comparative lens that the transnational classroom offered, students were able to reflect on the different movement building challenges that they faced. One student from Kenya, noting how many Canadian students chose to do a policy brief as a final project, suggested that government inertia made community work more actionable than policy work in Kenya.

Another key takeaway was the possibilities contained in a small action for a larger ripple effect and movement building. This also tied to the development of student systems thinking, whereby even one small change by one person is, from another viewpoint, a change in a system.

“Whatever solution I have, or whatever idea, however little it is, it can really be helpful to some people elsewhere in the world.” (*Kenyan Learner*)

VI. Movement Participation

A significant number of students joined or took leadership in the planetary health movement. Some joined local planetary health groups, for example a local club focused on forest regeneration and the Planetary Health Alliance’s regional hub.

Additionally, several students started projects or community groups on planetary health. Projects were mostly led through their professional roles; one involved extending food shelf life to address waste in food systems, and another focused on promoting community knowledge of the environment-health interconnection. One student has led a group in writing an academic paper critically analyzing the planetary health framework, and aims to be done by the end of 2026.

Other students have started community groups, including a recycling facility and a co-created women-led farm. Several were inspired to this action by topics covered in the course. Of their motivation to start a local recycling facility, one recalled:

“At first, I was scared about if I do it and nobody will be able to support me and all that. But then I remembered, while you were studying the planetary health course, somebody just suggested, what if we do a topic on the... on food insecurity, and everybody went along with it. And I was like, if that was able to happen, if I bring out my idea, it might also work...” (*Kenyan Learner*)

Meanwhile, Canadian students discussed how cold weather, the urbanized environment, and barriers to community outreach made community action appear less feasible than a policy brief project, and how cold weather disincentivized working outdoors.

“The community engagement project sounded really appealing in theory, and the idea of, like, working with an organization sounded really, really awesome. I think there was kind of the logistical stuff with it, but then also, like. I don't know, maybe there's less of a willingness to kind of do the outreach and, like, kind of ask an organization to partner and to go kind of... do all of, like, the social... social work around that, in terms of, kind of, building relationships and prioritizing those relationships.” (*Canadian Learner*)

3.3 Key Informant Interviews

A. Action Learning and Professional Applications

Action based learning focuses on teaching the professional skills that students will use.

Educators pointed to projects and presentations as a way of achieving the teaching of practical, hands-on skills. One faculty member, for example, discussed the long-term integration of action learning into a university program:

“They do proposal development in year 3 [...] Year 5, they all must learn how to be administrators, managers, of all these services, which somehow impact on health, influence health, has implications for health and the like.” (*Kenyan Educator*)

Another educator recalled a group of students who developed a biodegradable bandage:

“The banana stem, they also found that some... there's some medicinal value, in that... in terms of healing of wound. So they made the pilot bandage [out of the banana stem]. And surely the results were good.” (*Kenyan Educator*)

This educator attached the student's work to the importance practical lab skills developed in well-funded labs, including sampling and recording data.

B. Barriers to Pedagogical Implementation

Aspects of course structure acted as potential limitations for teaching pedagogy. Some professors mentioned how larger class sizes and the limits of course time made some pedagogies more difficult to implement:

“It's hard with a class of 500, but in my other smaller classes, I teach other classes that are smaller, and they also involve environmental ethics and whatnot, and part of their assignments is get outside.” (*Canadian Educator*)

Other challenges came from beyond the immediate classroom. One Kenyan educator referenced financial difficulties in creating field work opportunities for students. A Canadian educator, when asked about teaching movement building, responded:

“There's always been a bit of a tension in the academic world between, you know, promoting advocacy and social change and the role of the university to simply be the place where you come to cultivate the intellectual skills that are meant to be developed in a kind of, I guess I would say, normatively neutral way, right?” (*Canadian Educator*)

Other barriers to teaching movement building were associated with societal factors, with students being too busy with other familial or financial commitments and, on a broader scale, the dismantling of global multilateral action. However, one Canadian professor observed that movement building and action activities could be integrated into course assignments, making them less of a strain on students' time.

C. Theoretical Frameworks

Educators called on theoretical frameworks from diverse disciplines in order to express planetary health concepts to students, often placing them in relation and contrast to each other. One Canadian educator mentioned how they brought Indigenous perspectives on kinship, evolutionary biology, and religious perspectives into the classroom to encourage reflection on human interrelation with the world:

“He [Thomas Berry, priest] came up with a saying that, you cannot have-- and it sort of guides me in almost everything I think and do and write, You cannot have a healthy person on an unhealthy planet.” (*Canadian Educator*)

D. Case Studies

Two educators saw case studies as a way of supporting students systems thinking beyond siloes. As one Kenyan educator recalled, one case study they used integrated social sciences and ‘bench’ sciences because it:

“... required an understanding of the social structures of the communities in West Africa, and that is actually how the epidemic was managed, by understanding how these people [...] how they were organized [socially].” (*Kenyan Educator*)

The application of case studies from around the world was also a way of gaining a comparative perspective.

E. Critical engagement

Educators taught students critical thinking through hands-on projects, as well as theoretical engagement.

Community engaged (that is, involving community service), project-based learning, prompted critical thinking about how planetary health concerns arise. By learning in the community, rather than solely in the classroom, students encountered the complex environmental variables of the real world and were challenged to thoroughly consider the myriad pathways through which they affect health. After a community immersion, activities included class discussions, presentations, and report writing. This was another way of pushing students to engage meaningfully with the complexity of planetary health problems and envision the possibilities for causes and community solutions. In these environments, the professor role was to raise more questions and challenge learners to defend their perspective. One educator described their response to students that proposed solutions to community health problems they were exposed to:

“We will go back and ask you, as you are curing [in reference to curative community health interventions], what promotion are you doing? What prevention are you doing? What are you curing correctly?” (*Kenyan Educator*)

Deep engagement with theory was also identified as a crucial locus of critical thinking. In classrooms, this manifested through the analysis of critical argumentation and the importance of readings. One Canadian educator again emphasized that the educator’s role was to ask prompting questions, while students engaged with “the material and each other” to explore the different concepts.

F. Educator and Institution Collaboration

Educators were able to provide more educational perspectives and hands-on opportunities through collaboration with other academic divisions, schools, and organizations. As a result, students had the opportunity to think about planetary health from the perspectives of more disciplines, as well as having more opportunities for community engaged learning.

Reflecting on a community-engaged project that students from 8 different colleges of a school collaborate on together and bring their different perspectives to, one educator said:

“This interdisciplinary and interprofessional education promotes that: one, we learn to respect one another. Two, we learn to listen to one another. Three, we try to make sure that we are appreciating each other's perspective.” (*Kenyan Educator*)

Another educator was able to provide interprofessional education with veterinarians through collaboration with another university despite not having their own veterinary school:

“That project, we tried to invite students from [university], the veterinary students, for field engagements with our [university] students, and that was a very rich kind of exchange.” (*Kenyan Educator*)

One Canadian educator also mentioned that the development of educator development for teaching planetary health depends on collaboration with university faculty training divisions. This educator referenced a “critical shortage” of educators with the background to share planetary health knowledge, and how this can be addressed through incorporating previously existing resources into teaching.

G. Educator Role

Several educators framed their role as one of guidance:

“We take them out there to the communities and they ask these questions, and when they come back we guide them and tell them, what did you learn with these kind of questions that you asked?” (*Kenyan Educator*)

Another common refrain was that the educator’s role was to support students in actively engaging with and challenging the world:

“Ours is not to help students conform to the world. That’s not why I’m there. My role is to help students challenge the world to make it a better place.” (*Canadian Educator*)

H. Integration of Planetary Health

Several educators recognized the importance of integrating planetary health concepts into education long-term. For one Kenyan educator running a program over the course of students’ post-secondary education, this took the form of teaching theoretical concepts in first year, and integrating coursework with hands-on research and learning in the community in later years. For another, this meant ensuring students were exposed to interdisciplinary learning throughout every year of their training.

I. Student Centered Learning

Student-led problem based education is used to teach student entrepreneurship skills and innovation.

“We use the SPICES model. And the SPICES model just simply means: student-centered, problem-based, integrated in the community with electives, and we do things in a systematic manner.” (*Kenyan Educator*)

In this model, students were expected to write proposals addressing the community’s planetary health challenges and perspectives. Other educators included similar pedagogies that encouraged students to innovate solutions for community health problems. After a field trip to a settlement where students discovered potential water pollution, students wrote a report and interrogated potential solutions in class:

“Now we were discussing. [...] Where do you think there was possible contamination of that water? Then we all... we had all varied results. So we said now, the community needs to know [...] And from time to time, wash the tub with soap, washing the cup with soap. And then we also discovered the, you know, the toilet facilities, who are not very far from the standpipe... So people get from the... get out from the toilet, that is the... water they use for their hands, the same tap, they use it to draw water for domestic use.” (*Kenyan Educator*)

Student centered learning also manifests as attention paid to the student’s holistic needs, both for their learning and wellbeing. Attention to learning needs can mean allowing students to self-assess their final grade, choose their own assignments from an array of options, and co-create courses. Meanwhile, attention to well-being can be incorporated through bringing attention to students’ emotional needs. As one Canadian educator stated:

“I practice very purposefully bringing kindness and care into the classroom. We talk about-- and I try to center joy as part of that as well. You know, taking a doom and gloom approach when we’re talking about planetary health and the poly crises only gets you so far.”

This educator also reconnected the potential for action and empowerment through education to the importance of that holistic and personally attentive student-centered approach:

“I think supporting things that they already love and then modeling environmental action for them in small ways [...] is important as well.” (*Canadian Educator*)

J. Transformative Learning

Educators applied transformative learning pedagogies, which seek to reshape student perspectives, to build kinship with nature and student self-empowerment.

This student empowerment often related to political action. For example, one of the assignments for students was to write a letter to the Minister of Environment:

“You can send it free to Parliament Hill, snail mail, or you can send it free email. Here's the address. And suddenly they've just done it. They've done something they've probably never done before.” (*Canadian Educator*)

In general, however, transformative learning had the goal of “demonstrating to students how much power they actually have” (Canadian educator) as “proactive agents of change” (Kenyan educator). One Canadian educator did this through course projects:

“They don't have time necessarily to be engaged as, like, advocates and activists, and so in one of my courses, we built in now this, for the last three years now, we've organized this summit on campus. [symposium name], it's called, and so we've run those three.”

K. Learning in Communities

When classrooms expanded to the community, students were better able to apply systems thinking skills, as they were exposed to many different environmental factors.

“Why do you think it is changing? [...] Analyze the environment and see, that factory is there. That factory is there. That factory works 24 hours. That factory works 12 hours. [...] So you are able to gauge the source of the change in quality of the air at any given time...” (*Kenyan Educator*)

In the process of creating community learning opportunities, one educator emphasized the importance of preserving reciprocally cherished relationships, connecting this importance to Indigenous ways of knowing about relationality:

“We hosted an Earth Day event for [school board district] teachers who do this work and who have been doing ongoing professional learning with us as a sort of a thank you back to them. So wherever you can find those opportunities to not only deepen relationship, but also to honor the work that educators do in their classrooms and beyond is-- it's important, right?” (*Canadian Educator*)

Learning in communities was also seen as an aspect of transformative learning. Through community engagement, students were able to see some of the impact they could have, and then apply their skills to their future profession. Additionally, education transformed student relations with the natural world around them through land-based learning activities, even those that seem as small as including walks.

“I've gotten individual emails, reports from assignments, how being with the tree, sitting with the tree weekly has changed their perspective. I've seen multiple students join [student group] or join other organizations just on [university].” (*Canadian Educator*)

“Being out and about in the city absolutely brings a perspective shift on the part of my students. I'll hear things like, I... I never thought of... [park] as being such an amazing center for native plant species. I didn't realize until we sat in Philosopher's Walk for 15 minutes how clear the bird calls are, and how many birds are in [public area]...” (*Canadian Educator*)

4.0 Discussion

4.1 Rapid Review

This rapid review aimed to investigate what effect planetary health education has on student systems thinking and movement building. The literature reviewed found only 12 of 30 articles evaluated or found results of student participation in actively organising movements. Although more literature evaluates or finds results on student systems thinking or behaviour change, gaps in this literature are apparent, especially with regards to the academic discipline and location of the interventions. Below, some of these gaps are discussed.

16 of the 30 papers reviewed were specifically delivered for students in health fields or in a health sciences course. Other interventions specifically targeted students in veterinary or veterinary-adjacent fields, as well as students from interdisciplinary backgrounds. However, none of the interventions were designed specifically for those with a non-public health social science or humanities background. This may be partially attributed to the prevalence of planetary health language in medical spaces, and the use of MEDLINE as one of the databases searched. However, the search strategy also accounted for other frameworks around environmental health (for example, “political ecologies of health”). As such, this phenomenon suggests a need for integrating planetary health concepts in spaces beyond the sciences.

The geographical setting of most papers discussed here is also worthy of further examination. Twenty of thirty interventions discussed here were hosted by and for those in Australian, Western European or North American institutions. The interventions that were open for students globally (Ruiz de Castaneda et al., 2018) were in large part hosted by organizations in the United States and Europe (Schwind et al., 2016; Valentine et al., 2015; Visioli et al., 2022). Of the educational interventions were described as being delivered in or for African, Asian, or South American settings, they include in-person courses or course modules (Merduaty et al., 2025; Zandavalli et al., 2024), a distance learning Master’s program in Sri Lanka delivered by a U.K. institution (Kinnison et al., 2023), research workshops delivered in a collaboration by the University of Zimbabwe and Midlands State University (Oljans and Mickelsson, 2025), a virtual course available to students at universities in Brazil, Germany, Mozambique, and Kosovo (Vicente et al., 2022), and the AFROHUN-Uganda training program (Ssekamatte et al., 2022). This disparity may be due to multiple factors: perhaps planetary health education is taking place but not being reported on, or it is taking place in setting outside of higher education. Further investigation into what planetary health education looks like around the world is important for a truly global perspective and approach to planetary health education.

The literature on transnational education, to which this report contributes, is currently scarce. Here transnational refers to a course delivered with learners or educators from multiple countries collaborating. The interventions discussed in this rapid review are either courses and programs hosted online (Kinnison et al., 2023; Vicente et al., 2022; Visioli et al., 2022) or have selected participants gather in person for shorter, intensive training (Ruiz de Castaneda et al., 2018; Schwind et al., 2016). These interventions found that students found opportunities for collaboration either through their work with other students (Ruiz de Castaneda et al., 2018; Schwind et al., 2016; Vicente et al., 2022) or through the other institutions they were exposed to (Kinnison et al., 2023). However, the effective use of virtual platforms faces challenges such as internet access, adjusting to self-directed learning, and language barriers (Kinnison et al., 2023;

Vicente et al., 2022; Visioli et al., 2022). Language barriers especially may be exacerbated by a virtual setting (Vicente et al., 2022). These factors were part of causing a high dropout rate of 37% in one intervention, and, as the authors acknowledged, may play a role in broader patterns of low completion in virtual courses (Vicente et al., 2022). More research is required on how virtual courses can function effectively in cross-national contexts, and what a transnational classroom brings to systems thinking and the student experience overall.

Several factors that potentially complicate the impact of planetary health education are worth discussing here. Chiu et al. (2019) found in student evaluation of their One Health simulation that students already had a significant appreciation for the importance of collaboration across disciplines. Moro et al. (2023) report one student's qualitative feedback that the student gained little from the intervention due to previous engagement with planetary health topics. These two articles potentially suggest that in some cases interventions either are reaching or obtaining responses in from learners who are already engaged with planetary health.

Brar et al. (2025) noted how the high patient care workload, combined with other educational tasks, created a challenge in encouraging deep engagement from medical residents with planetary health case rotations. The difficulties of incorporating planetary health into busy curricula is also referenced by Zandavalli et al. (2024): student feedback on their Planetary Health course module was that the module's timing could be improved, due to the demands of several other courses at the time. High dropout rates in another course described workload as a major reason, although, as acknowledged by the authors, the course's structure as a virtual intervention may also be a reason (Vicente et al., 2022).

Moro et al. (2023)'s addition of a single planetary health fact each lecture of a physiology course was aimed at circumventing this challenge of more intense planetary health teaching. In the student evaluation, 50% of students stated that thoughts, actions, or behaviours had changed due to these facts, and 20% stated that they had 'somewhat' changed. Other articles described future steps they intend to take to adapt educational interventions, including to seek "protected time" for residents to take part in Planetary Health Rounds training (Brar et al., 2025) and adjusting the number of credits offered at the different hosting institutions to align with the course's workload (Vicente et al., 2022). Further student evaluation of ways to make planetary health education more manageable is a potential future direction of study.

Further research is also needed on specific pedagogies. For example, the learners who took part in co-creation did not evaluate their co-creation experience. Game-based approaches are mentioned only twice, in the form of a card game (Stevens et al., 2024) and the gamification of a simulation using augmented reality (Álvarez-Nieto et al., 2024).

4.2 Student and Faculty Interviews and Focus Groups

Notable topics on which student and educator perspectives diverged or converged are discussed here.

The literature review found that including planetary health education was difficult due to the high workload students already experience. Similarly, a Canadian student and educator both mentioned time constraints as a barrier to student action and movement building. The educator incorporated movement building assignments into their courses to address this.

Canadian and Kenyan educators both recognised the important of community engagement in movement building. However, Canadian educators appeared to conceptualize movement building pedagogies as encouraging political engagement more often. For example, one described an assignment where students wrote letters to the Minister of Environment.

Another, when asked about movement building, responded with recollections of their experience in student activism.

In terms of student interviews and focus groups, more Kenyan students mentioned taking part in some kind of community action than Canadian students. Of the six Canadian students interviewed, three discussed their involvement in community action, but for two of them, that action was rooted in their connections to a different country. Several factors can potentially play a role in explaining this. One potential explanation is that fewer Canadian students than Kenyan students were interviewed. Additionally, the University of Toronto has few active student clubs working at the intersection of environment and health.

The rapid review and original data collection both find, at times, complicated results in the evaluation of movement building. Two interventions found that students faced barriers in taking more sustainable steps professionally: Álvarez-Nieto et al. (2024) found that despite more sustainable professional actions, there was also a statistically nonsignificant increase in the sense that students could not challenge unsustainable actions in the workplace. Students also reported in Ssekamatte et al. (2022) that applying One Health perspectives in the workplace was limited by reluctance to cooperate across disciplines and a lack of general One Health training. In this report's data collection, social factors in the world outside the classroom also created limitations on what actions students or educators could take.

Stevens et al. (2024) found that despite students thinking more about what sustainable actions they could take in their daily lives, their actual behaviour did not change. Furthermore, learners felt more despair and worry, and that individual actions were insufficient to address climate change. On a potentially related note, Álvarez-Nieto et al. (2024) found a nonsignificant decrease in learner sustainable behaviour at home, though this occurred over the course of a four year nursing degree. These findings do not align with those of this report, which are that students felt more motivated to change their behaviour and that their actions could have a meaningful impact on the world around them. Future directions for research include investigating how pedagogies may build climate hope, or, inadvertently, decrease motivation for personal behaviour change and increase climate despair.

Different perspectives on the efficacy of guest lectures are present in interviews and focus groups. In articles from the literature review, guest lectures, or single lectures by different experts, were used to incorporate perspectives from different disciplines (Amberger et al., 2025; Dumm et al., 2023; Merduaty et al., 2025; Ruiz de Castaneda, 2018). While one Kenyan educator also described this use case in their courses, a Canadian educator felt that guest lectures were the least effective of educational interventions for that educator to deliver. This is due to the limited time of a single lecture, and thus limited opportunity to shape student long-term perspectives. In the evaluation of this course, however, students discussed guest lectures in positive terms, citing them as inspiration for the focus and method of their participation in or potential participation in planetary health action.

Finally, two Canadian educators discussed the importance of readings in building student capacity for critical engagement. Similarly, one Canadian student mentioned that more complex theoretical readings would have helped with a deepened understanding of how different systems connect. However, they also emphasised that they enjoyed the shorter, theoretically lighter readings used in the course.

This report underlines the importance of further research into how transnational education can support movement building and systems thinking. In the rapid review, 12 of the 30 interventions evaluated or found some kind of result relevant to student action in movement

building. These results often took the form of evaluating student capacity for advocacy or climate action in health contexts, student networking, or whether students pursued projects on planetary health. Data was in large part collected quantitatively or through the author's personal observations. This report contributes to the state of qualitative data and knowledge of specific pedagogies that support student movement building capacity.

Behaviour change, another form of being part of movements, is in the academic literature mostly discussed through professional behaviour changes. 8 of the articles included here found results on behaviour changes in personal life habits. These changes in daily, personal behaviour are also an important aspect of movement building and systems thinking, one that this report finds more evidence of.

Finally, the current academic literature provides both quantitative and qualitative data on systems thinking in learners. It should be noted, however, that the rapid review did not find any articles that used qualitative data collection specifically to evaluate systems thinking.

Several students expressed interest but were unable to join interviews or focus groups due to work and academic commitments. One Kenyan student could not join the virtual meeting room for more than a few minutes at a time, and was thus unable to join the conversation.

5.0 Conclusion

This research investigates a transnational planetary health course's ability to support student systems thinking and movement building. As one of few educational interventions that crosses national boundaries to provide a global educational experience in a globalized world, the course acted as a site where students expanded their viewpoint on how planetary health challenges play out around the world, what their own relationship with nature can look like, and the impact that they can have on their communities. Guest lectures, student discussion, reflective exercises, and projects also played key roles in painting the image of what student impact in the world could look like. The Planetary Health course is evidence that a transnational classroom can promote movement building and systems thinking for a more sustainably healthy world. Further research on how students experience transnational classrooms, systems thinking, and movement building is needed in the future.

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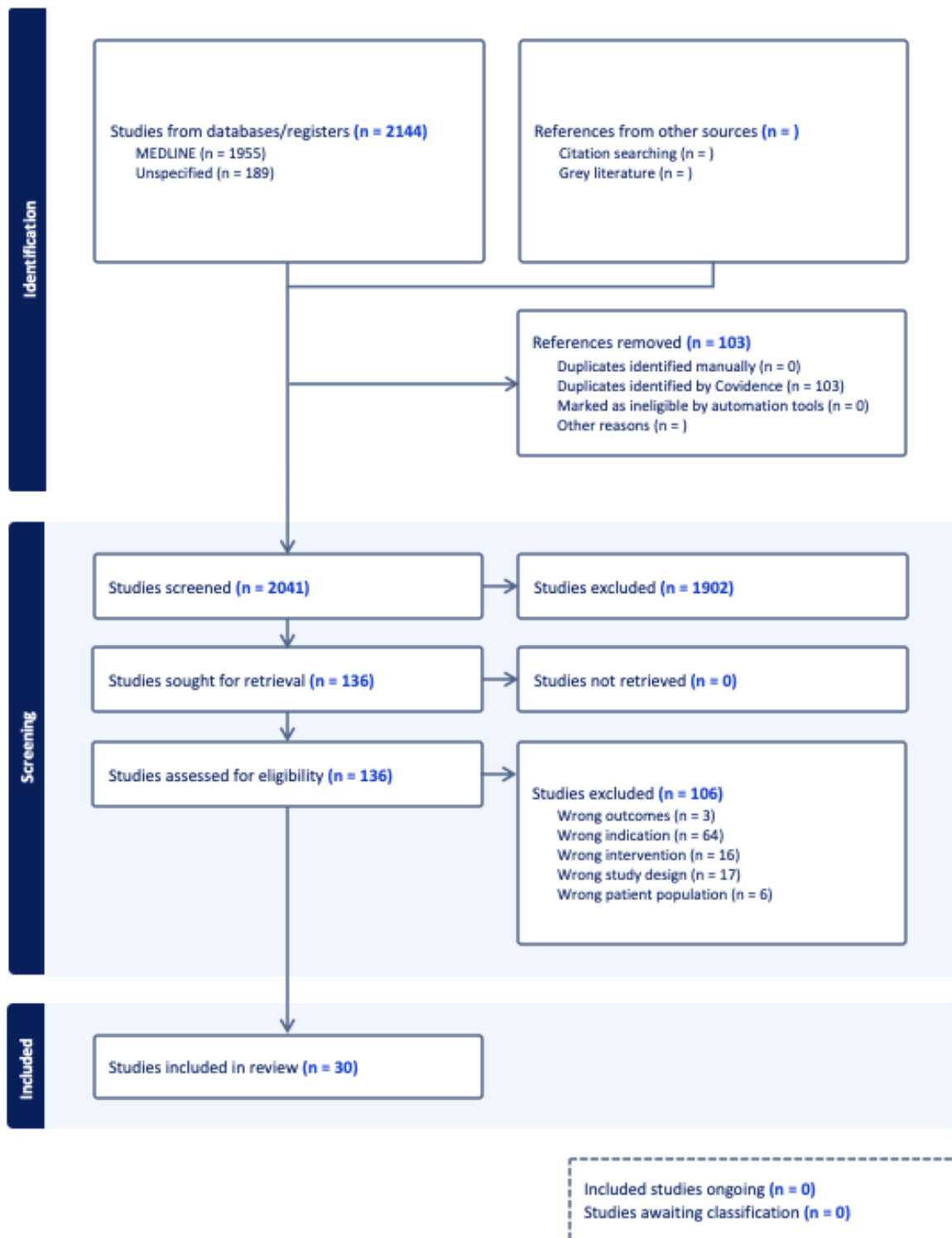
Appendix A: Rapid Review Search Strategy

Table 1: Rapid Review Search Strategy

Terms related to higher education	((higher or further or clinical or medical or tertiary or law or graduate or under?graduate or post?secondary or post?graduate) adj3 (syllab* or curricul* or school* or learn* or course* or education*)) or college* or universit* or ((doctoral* or master*) adj4 program*) or freshm#n or soph?more* or junior* or premedical or senior or seniors).kf,tw.
Terms related to planetary health	(planetary health or (environmental health adj2 justice) or (sustainab* adj2 health*) or geohealth or One Health or planetary medicine or Political ecolog* of health or ecohealth or indigenous health).kf,tw.

Appendix B: Rapid Review PRISMA Diagram

Fig. 1: PRISMA diagram, downloaded from Covidence.



Appendix C: Rapid Review Data Summary Tables

Table 2: Rapid Review Data Extraction

Study Reference	Population and setting	Publication Type	Interventions	Hypothesis	Methods	Relevant Outcomes Measured	Results	Other notes
Acosta et al. 2024	Spring 2023. Undergraduate students at a large public university. 44-50 students/session.	Single study	One Health simulation as part of a large global health course. Students played national and state roles in a fictional country facing health threats. Students were meant to assess priority threats and compare interventions in different contexts, with the goal of minimising the number of Disability-Adjusted Life Years. Students had previously covered topics in communicable and non-communicable diseases, neglected tropical diseases, global stakeholders, and One Health.	A simulation activity rooted in systems science is an effective tool towards the learning objectives of an undergraduate Global Health course.	Action research approach culminated in focus group discussion with 6 students. Students also completed a written questionnaire. Both data sources were analysed using inductive approach, and results coded.	Systems thinking in One Health. Students asked for thoughts on institutional roles, and horizontal and vertical interactions in One Health interventions.	a) Interactive strategy seen as highly effective in understanding the complexity of global health, especially compared to lecture based studies. Students were able to effectively prioritise issues and compare interventions using a systems thinking approach (ie. discussing various possible scenarios). b) Improved understanding of health connections with other disciplines (ie. health and agriculture). Understanding of how societal power dynamics affect health, as well as the challenges that the global aspects of the issue raise. c) Students enjoyed having an activity where they had the freedom to act as public health professionals. Students were able to think 'outside the box' without risking their grade.	
Álvarez-Nieto et al., 2024	September 2019-May 2023. First year nursing students at a Spanish university, who expressed desire to participate. 120 students enrolled.	Single study	Three health and sustainability scenarios with augmented reality measures used to teach students over multiple courses in nursing degree. Yr 2: scenario about asthmatic child. Yr 3: scenario about waste management in healthcare and bladder	N/A	Pre and post-intervention questionnaire fully completed by 76 students before the program and after each scenario. Used the Sustainability Attitudes in Nursing Survey (Likert scale questions). Questions were added to survey student sustainability in nursing and work practices.	Application of sustainability at home and work. Awareness of unsustainability at work. Willingness to challenge unsustainability at work.	a) Significant improvements in attitudes toward sustainability were found pre- vs post-intervention, except for in response to the question about applying sustainability at home (saw a decrease). b) Saw significant increases in application of sustainability practice and awareness of unsustainable practice at work. Significant increase in awareness of	Cases used included data from local issues, ie. showing pollution data from cities in Spain

			catherisation, and one about complex needs for an older person and health risks of heatwaves.				unsustainable practices in the work environment only increased in Yr 4, after all scenarios and the last clinical internship. Non significant increase in willingness to challenge unsustainable practices at work and in student's sense that they were unable to challenge unsustainable practice in their work environment.	
Amberger et al., 2025	2021-2024. Mostly medical students years 3-5 at Goethe University Frankfurt; a minority in other science programs.	Single study	Elective course introducing planetary health, the direct and indirect impact of climate change on health, climate change communication, and professional roles. Used a flipped classroom format role play simulations, infographic production, and problem-based activities. Focused on fostering discussion and class dynamics. Course development involved physician, health scientist, educator, and geoscientist, and was based on Kern's six-step approach to curriculum development. Design based on a literature search and expert discussions on teaching.		Pre-/post- test comparison using Likert scale questions completed by 42 students. One sided 5% Wilcoxon test determined differences in survey responses pre/post intervention. Effect size (r) calculated as well for practical significance. All calculations completed using R.	Students assessed on sustainable living and belief that they can play a role in climate protection. Also assessed on sustainable behaviour as physicians.	Significant increase in applying sustainability in personal life post intervention. Sustainability approaches in their role as physicians was not measured pre-intervention but most students responded 'agree' or 'strongly agree' to questions about sustainability attitudes in the workplace (ie. "I can imagine bringing up the connection between climate change and health with patients").	
Brar et al., 2025	Internal Medicine residency students at	Single study	"Planetary Health Rounds": integrate		Post-intervention survey included qualitative and quantitative	Survey evaluated intention to change	Preliminary results from post-intervention survey are reported. 83% of	

	Dalhousie University, Halifax, Canada.		climate change concepts and healthcare sustainability into Internal Medicine residency program. Learners catalogued the emissions associated with patient stays by mapping treatment to healthcare emissions data in the HealthcareLC A Database and then calculating how much oil would have been burnt. Post-rotation, case analyses was presented to trainees, staff, and Green MTU team. Emission sources, waste, and climate change-healthcare links were discussed at the presentation. Vegetarian lunch provided to encourage attendance.		questions. No analytical methods reported. 75 respondents.	practice and types of intended changes	respondents intended to change their healthcare practice. Intentions included reducing lab work, length of stay, and waste.	
Chiu et al., 2019	Participants were undergraduate, graduate, and veterinary students; some professional veterinarians also joined. Workshop at Colorado State University, U.S.. 18 total participants.	Single study	Four hour student hosted and designed workshop. Participants given a hypothetical budget, list of diagnostic tests with prices, and opportunities to consult with experts from different disciplines. Expected to create a list of potential causes and a potential response to a hypothetical enzootic outbreak's		Pre-/post- test evaluation questions using 1-10 Likert scale questions. 17 students completed both questionnaires. Wilcoxon signed-rank tests were used with .05 significance.	Students assessed on perceived importance and knowledge of different fields (ie. disease ecology, pathology, etc.) during a wildlife disease outbreak.	No significant change in perceived importance of disease ecology, molecular phylogenetics, microbiology, or collaboration between disciplines. Significant increase seen in perceived importance of pathology, as well as knowledge of all topics.	Personal discussions with participants reported that they benefited from didactic lectures.

			cause, with confounding plant toxicity issue. Goal was for participants to articulate findings, develop response based on potential causes, and discuss importance of multidisciplinary approach to wildlife disease outbreaks.					
Clery et al., 2021	February 2020. Third year undergraduate medical students at the University of Bristol, U.K..	Single study	Interactive workshop based on the SusQI (sustainable quality improvement) toolkit. Lessons delivered as lecture followed by workshops, on various topics. Effort made to include case studies of local QI projects. Students encouraged to then plan a SusQI project and clinical teaching fellows were available to offer support.		Pre-/post- test questionnaires and focus groups. Questionnaires developed using Kirkpatrick's theory of motivation and transformative learning. Cronbach's alpha used to evaluate internal consistency. Verbal feedback also given as participants left a session. Focus groups conducted 3 months after teaching to evaluate long term effects.	Participants assessed on likelihood to take action for reducing environmental impact, and likelihood and confidence for involvement in quality improvement projects.	Students actively requested support through post-session questionnaires for implementing SusQI changes. Some students reportedly attempted SusQI projects. Improvement in student self-rated likelihood to take action to reduce environmental impact in their future job.	Data collection regarding SUSQI projects started post intervention was interrupted due to COVID.
Dumm et al., 2023	Medical students from German-speaking medical schools in Europe. 1531 students total involved.	Single study	"Eat This!" lecture series; 11 live 2hr online lectures. Credit as an elective course given at 3 universities. Content based primarily on Guidelines for Nutrition Therapy, as well as UNSDGs, public health nutrition, and EAT Lancet Commission work. Lecturers invited based on their academic		Online survey service used to deliver 1-5 Likert scale survey. Student knowledge assessed using a single-choice questionnaire. Principal axis factor analysis with an oblique rotation used to evaluate psychometric data and factor dependencies; Cronbach's alpha used for reliability analysis. Kaiser-Meyer-Olkin measure verified sampling quality.	Student attitudes toward climate change awareness and nutritional medicine	No significant differences in diet between control group and Eat This students. Climate crisis awareness and interest in nutritional medicine increased. Climate crisis awareness measured via rating agreement to statements linking nutrition and planetary health. No significant difference between Eat This students and control group in link between nutrition, health, and climate change, but significant increase in climate crisis	

			background. Lectures included case studies and interaction (ie. surveys).		To test potential differences between control group and main group, unpaired t-test used for interval scaled questions, Mann-Whitney U-test for ordinal scaled questions, and x squared for categorical variable.		awareness among Eat This students.	
Habermehl et al., 2026	Third and fourth year medical students at the School of Medicine, Colorado State University.	Single study	Nine-month asynchronous course and two 2-week immersions. Culminates in capstone project, creating framework to resolve a One Health challenge in a specific population. Constructivist learning approach rooted in prior knowledge and experiences, and promoting active engagement. Case based, interprofessional (opportunities to work with professionals in different sectors) and experiential learning. Guided by frameworks of systems thinking, communities of practice, and transformative learning. Collaboration with other fields emphasised, and grounded in community where the course is delivered.		Curriculum rated on a 1-6 Likert scale.		All students reported clear understanding of how climate change affects ecosystem, human, and animal health. Post visit to meat processing company, students indicated understanding of impact of food production on health. Students also reported increased understanding of the mining industry and interconnections with human, animal, and environmental health. All students indicated more confidence about collaborating with public health professionals to address interdisciplinary health issues. Almost all students indicated that course helped them integrate and apply content from other parts of medical curriculum to improve patient care.	
Kinnison et al., 2023	Distance learning MSc programs by	Single study	Two masters programs (Veterinary Epidemiology		Interviews and focus groups including current and former	No specific outcomes measured.	Students who took part in Master's program saw general career	

	veterinary school in Sri Lanka and one in the UK. Also evaluates a PGCertVetEd course to develop abilities in teaching and assessment methods; not focused on in the rest of data extraction.		and Public Health, or Livestock Health and Production). Three core and four optional modules to be offered, depending on what the student feels is most relevant. Interactive discussion forums and activities that can be adjusted to local contexts. Examination is paper-based. Assignments include essays. For VetEd course, assessments occur through reflective assignments, based on a teaching session, and the presentation of a teaching idea in pairs.		distance learning students in English. Manifest deductive qualitative content analysis performed on transcripts. Analysis focused on motivation/expectations, impact, and challenges/improvements for course. Guided by Kirkpatrick's evaluation of the teaching model.		development; several became visiting lecturers in undergraduate veterinary courses. Collaborations were developed between universities, leading to published papers.	
Lemke et al., 2023	Winter 2022. 16 medical students in their clinical phase; 4 unfilled spaces filled by students from other disciplines. Goethe University Frankfurt.	Single study	Elective climate change and health course. Emphasised climate change health consequences and possibilities for action in clinical and practical settings. Lectures online. Final written reflection assignment.		Pre-/post- test questionnaire, made up of 37 Likert scale questions on knowledge, attitudes and behaviour. Comparisons performed using one-sided 5% significance Wilcoxon test. 16 students completed evaluation. Effect size (r) calculated.	Sustainable behaviour and as a physician evaluated. Likelihood of applying course learnings to role as physician evaluated (only post-test data collected).	Significant increase in 'living sustainable lifestyle', though not in 'reflecting on sustainable lifestyle'. General agreement that they could envision discussing climate change-health relation in patient interviews	
Mainey et al., 2024	June-September 2024. 2nd and 3rd year mental health University of Greenwich students and mental health and adult nursing students at the	Single study	Planetary health political action sequential simulation. - Students first reviewed sensitising materials. - Students acted as nurses in clinical situation with environmental		Pre-/post- tests using: - Nurse Professional Values Scale (caring, activism, and professionalism) - Political Efficacy-Short Scale, (belief of influence over politics) - Perceived	- Nurse Professional Values Scale (caring, activism, and professionalism) - Political Efficacy-Short Scale (belief of influence	Overall, significant increases in student responses to all scales except Social Justice Scale (SJS). Cohort 1 saw increases in all scales except for in SJS. Cohort 2 only saw significant improvements in Political Efficacy and Perceived	

	University of Essex. Total 256 students.		health factors as play. Scenario followed by teaching session on advocacy and political action. - Community dialogue simulation to decide on collective political action to establish access to clean water or air. - Governmental simulation where students provided recommendations to nurses intending to peacefully protest. Goal for students to understand the impact of political action over time, different types of political action, and the relationship between their profession and political action. - Cohort 1 (UGreenwich, mental health nursing) focused on climate anxiety from water contamination. - Cohort 2 (UESsex, mental and adult health nursing) focused on climate anxiety. - Cohort 3 (UGreenwich, adult nursing) focused on respiratory issues and air pollution.		Political Self-Efficacy Scale - Short Form (confidence to take part in representative democracy) - Social Justice Scale (social justice attitudes and intentions, ie. for engagement) - Environmental Locus of Control Scale (belief of control over environmental outcomes) Paired t-tests and Wilcoxon signed-rank tests compared pre/post results. 75 responses.	over politics) - Perceived Political Self-Efficacy Scale - Short Form (confidence to take part in representative democracy) - Social Justice Scale (social justice attitudes and intentions, ie. for engagement) - Environmental Locus of Control Scale (belief of control over environmental outcomes)	Political Efficacy. Cohort 3 only improved in Nurse Professional Values Scale.	
Marwah et al., 2024	2023-24. Medical residents at the Children's	Single study	Climate justice curriculum as part of the longitudinal advocacy	Post participation, residents will	Pre-/post- test comparison of Likert surveys. Wilcoxon sign-rank used to	Understanding of climate change effects on	Increased intention to discuss health impacts of climate change with patients and consider	

	Hospital of Philadelphia Pediatrics Residency Programs.		program in the pediatrics residency program. Led by residents, fellows, attendings, faculty focused on climate change/curriculum design/health law/community engagement/narrative medicine. Learning objectives developed using Bloom's Taxonomy framework. Four sessions: - Intro to Climate Justice Advocacy (Post-graduate Year 1) - Climate Change and Pediatric Health (Post-graduate Year 1) - Climate Justice and Narratives Medicine Advocacy (Post-graduate Year 2 or 3) - Health System Sustainability (Post-graduate Year 2 or 3)	report increased awareness of climate change health threats, more agreement that patient health is impacted by climate change, increased agreement that health providers can be effective climate advocates, and more intention to address the impacts of climate change with patients.	analyse for change. Medians are pairwise averages used as a measure of difference. Theory of Planned Behaviour framework used in surveys.	humans health and human health inequities. Understanding of how health care system affects environment. Intention to implement sustainability in day-to-day practice.	sustainability in practices. Increased agreement that general and patient health is affected by climate change. Increased understanding of how climate change contributes to health inequalities. 68 students completed all surveys.	
McKeown et al., 2025	2023. Students mostly in third year; part of intervention as a mandatory part of the Anatomy & Developmental Biology major. Most students completing either a Science or Biomedical Science program. Large Australian	Single study	Intervention was a workshop part of a third/final year course, "Developmental and anatomical basis of human health and disease". Mandatory course for Anatomy and Developmental Biology majors. Workshop co-designed by unit convener and student volunteers.		Pre-/post- test to rate understanding planetary health. Student notes from the session also collected. Jamboard content analysed but not thematically due to small number of groups.		When prompted to discuss how Indigenous values can improve scientific health practices, students discussed improvement of sustainable agricultural practice and improve thinking about health connections on different ecosystem levels.	

	higher education university. 33 students took part.		Aboriginal Larrakia and Wadjigan colleague were consulted to review content and slides were included contrasting Western and Indigenous perspectives. Goal was to revise previous topics and apply a planetary health lens. Learning objectives: - Identify environmental factors that impact health - Summarise the development of the organs and the factors that influence development - Describe practical ways in which Indigenous knowledge can be prioritised in medicine and planetary health.					
McLean et al., 2022	2018-2022. 2nd-year medical students at Bond University, Australia.	Single study	Assignment in a medical curriculum with planetary health integration (ie. eco-biopsychosocial Model of Health and Wellbeing, sustainable healthcare). Students create: - Product proposal (4% of final grade) - Product (5% of final grade) - Reflective critique (1% of final grade) Project must apply SDG13 and one other SDG. Pairs of academic graders select the best two		Data taken from assignments over multiple years. Data taken on planetary health issue focus, intended audience, final product format, and second SDG made the focus besides SDG13 (Climate Action)		Waste, pollution, and poor health were most commonly addressed. Mostly selected SDG12 (Sustainable Production and Consumption), SDG3 (Health and Well-being), and SDG6 (Clean Water and Sanitation) as the secondary SDG to SDG13 (Climate Action). SDG1 (No Poverty) and SDG10 (Reduced Inequalities) were never selected.	

			products, and teams also pitch their products to peers that vote for the People's Choice.					
Merduaty et al., 2025	Academic year 2023/24 and 2024/25. Mostly second year and above Bachelor of Nursing students, but other student could take the course as an elective. Universitas Indonesia.	Single study	Course designed for Bachelor of Nursing students. Open to all students to encourage interdisciplinary work in the class. Course ideated using design-based research framework. Final year nursing student also helped with some stages of development. In calss debates and online forums used to promote critical thinking; assessments included formative and summative evaluations and group-based work.	Diverse academic backgrounds of student allows students to approach climate-related health issues from multiple perspectives.	73 learning evaluations survey, sent out after course completion, and 12 semi-structured interviews were conducted on Zoom. Interviews conducted by a member of the team not involved in teaching. Survey used 1-6 Likert scales and analysed by university administration, rather than the research team. Thematic coding of interviews conducted used Braun and Clarke's six-phase framework for analysis, and both deductive and inductive approaches.	Interviews	Themes from the analysis of interviews included a paradigm shift in climate change perspectives, and recognition of the importance of collaboration across disciplines for cliamte action. Students noted that they came to realise that climate change's effects is not just on the earth, but also the people living as part of it. Additionally, students talked about how climate change's many various effects mean that various professions are needed to collaborate for action. Debates and photovoice were seen as important for learning from different perspectives.	
Moro et al., 2022	Students in a first year health and medicine physiology course. 100 students in course. Australian university.	Single study	Weekly physiology lectures were 50 minutes long, followed by 1 hr tutorial. PowerPoint lecture slides released ahead of time. One planetary health fact introduced during lecture; 12 total. As part of a slide, relevant planetary health fact inserted in bottom left corner and solution + link in bottom right. Not substantially		Survey with six 7 point Likert scale questions showed participant perceptions of health facts. Open ended questions also included, asking whether students sought more information on the topic, further interest in planetary health, and for a definition of planetary health. 44 students completed survey.	Personal response question on whether actions, behaviours, or thoughts have chanded due to planetary health inclusions.	50% stated that actions, behaviours, or thoughts had changed in response. 20% said somewhat, and 30% said no. Some reported that they were more cautious about waste in the lab; others that while they appreciated the facts, their actions did not change.	

			discussed in class.					
Oljans & Mickelson, 2025	Interdisciplinary students and educators (ie. policy, medicine, pharmacy, veterinary science, education, environmental science). Midlands State University, Gweru, and University of Zimbabwe, Harare. 60 learners.	Single study	Two one-day participatory research workshops on the intersections of health, food, and AMR. Case vignettes utilised by presenting the situation, then having participants discuss it, then presenting the impact of antimicrobial use on environment and humans, and finally prompting more discussion focused on potential solutions and ethical issues. Topics were thus introduced via storytelling.		Workshops were audio recorded. Recordings and contemporary notes used for transcription. Analysis used Braun and Clarke (2006, 2021) steps and drew on Biesta's theoretical framework of qualification, socialisation, and subjectification as educational functions. Inductive readings created data overviews and showed patterns in data. Deductive readings focused on qualification, socialisation, and subjectification. Final themes were compared with empirical materials to ensure that key dimensions of the workshop were covered.		Three educational functions analysed: qualification, socialisation, and subjectification. Participants considered factors around AMR such as responsibility belonging to both the farmers using antimicrobials and the government; social factors potentially affecting the use of antimicrobials and the spread of AMR.	
Park et al., 2023	Cross-disciplinary learners from University of Illinois Colleges of Medicine, Veterinary Medicine, Applied health Sciences, and Champaign-Urbana Public Health District.	Single study	Interprofessional One-Health case study activity based on diarrhea outbreak from manure-contaminated water supply. Community public health organisation played role in development and deployment. Activity timing was coordinated to relevant courses in health science colleges. Students split into different breakout rooms to engage with students from other disciplines; facilitators		Retrospective pre-/post- Likert scale test. Analysed using paired t-test, with significance of 0.05, and the Wilcoxon signed rank test. 25 students completed the questionnaire.	Questions asked about consequences of flooding on human, animal, and community health, and the interprofessional nature of the case study.	Awareness of the interprofessional nature of the exercise increased by 1.5 standard deviations.	

			asked relevant questions to students. Relevant questions designed by faculty collaboration and a public health representative.					
Ramku mar et al., 2021	Targeted to third and fourth year medical students rotating through internal medicine clerkship at University of Illinois College of Medicine in Urbana. 11 students.	Single study	Standardised patient case dealing with the risks and mental/physical health effects of wildfire smoke exposure. Developed by internal medicine faculty members. One cohort completed a group activity and one-on-one encounter activity.		Pre-/post- test 5 point Likert scale test. Post survey added question about need for more prior content exposure and for a narrative comments question. 10 students completed surveys. Paired sample t-test used for analysis		Students noted in qualitative responses that they would incorporate information into gathering patient histories in the future and the climate/home health quality measures that affected health. Only Cohort 2 showed significant differences quantitatively in knowledge of health impacts of climate change.	
Ruiz de Castanea et al., 2018	Students who had taken a One Health MOOC (Massive Online Open Course) on One Health.	Single study	Students from two different Massive Open Online Courses on One Health were gathered in Switzerland for five days to work with peers and experts on health challenges in animal-human-ecosystem health. Five day program included student led One Health project pitching and presentation, lectures, and project development. Experts came from fields including different dimensions of One Health and computer science.		Anonymous online satisfaction survey.		Research outcomes has created opportunities for more collaboration; ie. group working on Project A has continued collaboration; Project C followed up on by students from UNIGE's Master in Global Health to explore manufacturing challenges. Overall, links between Swiss working groups on One Health and international institutions working on One Health were strengthened.	
Schwind et al., 2016	Vet students. Various countries. Approximate	Single study	Envirovet Summer Institute' is focused on		Known past participants from 1991-2010 were contacted; 45%	Steps and actions taken in response to	19% pursued more experiences (ie. work or research) in ecosystem health as	

	ly 400 students total.		training vet students to improve ecosystem health. Intensive 60-70 hrs/week, 6-7 week summer program. Immersion style of education, using lectures, laboratory projects, field demonstrations, and hands-on experiences. Session 1: introduces the concept of wildlife and ecosystem health, focused on critical analysis/problem solving skills. Session 2: expanding knowledge; use of aquatic biodiversity as warning system of ecosystem mismanagement. Session 3: ecosystem health applications within social and economic constraints of developing country. Students learn in the local community.		of past participants responded. Students were surveyed for demographics, occupational history, Likert scaled programme questions, and short answer programme impact questions. Associations between demographics and occupational outcomes tested using chi-square test or Fisher's exact test. Phrases from qualitative responses grouped using constant comparative method approach	intervention.	a result of intervention. 20% sought further education on the topic. 16% felt that their perception of the environment changed as a result. Long term, 17% felt that the programme guided career decisions or guided sustainable lifestyle choices. 9% stated that the experience helped them maintain a network of people with similar interests. 24% stated that the program influenced their eventual career choice.	
Shearer and Kniel, 2026	Pre-vet, animal bioscience, and food science students. University of Delaware, 319 participants over three semesters.	Single study	Foodborne disease outbreak activity with escape room game features (data presented as visual, text, or manipulative clues). Begins with instructor introduction to food safety and instructions, then activity, and a class discussion of		Post test surveys given to students, asking for rating their agreement with different statements. Open ended prompt also included asked what the most enjoyable aspect of the exercise was. Pre-/post- test quiz questionnaire tested changes in knowledge.	Understanding of the role of food and water in illness transmission; complexities surrounding issues of water availability; role of food and water in illness transmission	No significance tests performed on relevant topics, but more than 60% of students either agreed or strongly agreed with each question.	

			findings. Goals include engage critical thinking, teamwork, and communication skills. Students are also introduced to different careers relating to the topic, and their interconnected roles in food safety. Ultimately, learning objectives include: - Characterise impact of foodborne illness on health. - Identify factors involved in pathogen transmission and evaluate efforts to minimise food disease risks. - Identify stages of foodborne illness outbreak investigations and analyse outbreak data. - Identify professional roles and regulations involved in food supply safety.					
Ssekamatte et al., 2022	AFROHUN-Uganda alumni from 2013-2018 cohorts. AFROHUN includes universities from Cameroon, DR Congo, Ethiopia, Kenya, Rwanda, Senegal, Tanzania, Uganda, Cote-d'Ivoire.	Single study	Students take theoretical courses in collaboration, One Health management, culture and ethics, behaviour change, communication, leadership, One health outbreak investigation, One Health systems thinking, risk analysis, policy and		Systems Theoretical Framework of career development used to understand alumni employment. Quantitative data was collected via structured questionnaire on employment status of respondents. Respondents were selected randomly. 12 respondents were then purposefully		Results from qualitative interviews showed that One Health approach learned in school was important for community entry and health promotion in the workplace; knowledge of multidisciplinary approaches was also crucial in working with those from other backgrounds (ie. environment) in their jobs. Organisations with	

			advocacy, One Health research, One Health principle and concepts infectious disease management, gender and one Health, epidemiology, and ecosystem health. Students also take field experiential learning.		selected based on demographics and employment status for 30-45 minute qualitative interviews.		existing partnerships with other groups/disciplines and focused on cross disciplinary issues enabled One Health applications. Participants observed that limited knowledge of One Health and negative attitudes to working with others limited the organisation's applications of One Health.	
Stevens et al., 2024	Third year undergraduate medical students, 2023. Erasmus Medical Center, Rotterdam, the Netherlands. 145 students (38.6% of the cohort) took part in the intervention.	Single study	Two hour 'serious game' intervention embedded in an introductory public health course for third year medical students with an introductory lecture on planetary health. Included: - An introduction to the game by the instructors - Part 1: linkages between climate change and health were discussed by students in smaller groups. Game involved cards showing how human activities led to climate change and eventual social and health impacts. Focus of game shifted from individual health to societal impacts (ie. migration) from rounds 2-4. - Instructor role was to offer directions and ask further questions. - Part 2: group discussion and		Pre-/post-intervention surveys used to gather quantitative data using Likert scale questions. Changes assessed using Wilcoxon signed rank test and confirmed using Bonferroni correction. Focus group discussion held after the game and analysed using NVivo using Braun and Clarke's six stage thematic analysis. 59 students completed the surveys, and 11 the focus group discussions.	Pre/post intervention questionnaire asked about knowledge about climate change and health, as well as attitudes toward the importance of climate change and health for medical students/doctors. Pre-test also collected demographic information, while post-test included evaluation questions.	Following the intervention, students seemed to think more about small sustainable actions they could make in their daily lives. But they also felt individual actions were inefficient, felt more climate worry, and felt more despair. Immediate behaviour change did not seem to occur in the weeks between the activity and focus groups.	

			reflection of person and professional responsibilities , either within the smaller subgroup or with the whole group. Discussion was structured to involve several themes: emotions, vulnerabilities, and responsibilities .					
Uehling et al., 2019	Students generally entering their first year of a health professional program at the University of Saskatchewan, Canada.	Single study	OHLE (One Health Leadership Experience) is a 3 day event held annually. Includes a networking dinner, One Health talks by guests, case study sessions, and a leadership session with guest speakers and small group discussions. Goals included: - Introducing One Health to USaskatchewan students - Stimulating student engagement with One Health leaders and students across health sciences - Encouraging students to be One Health leaders and change agents		Yearly assessments were used for feedback. Also, five year assessment (included all students from the past five years) gathered data. Frequency, median, and IQR were used as summary statistics. Kruskal-Wallis test and Wilcoxon rank test used for comparison of survey responses, and p value for significance. Focus groups were also used, with 14 participants attending. Braun and Clarke's thematic analysis framework and NVivo used for qualitative analysis.		26.8% reported initiating activities and discussions on One Health on campus (ie. bringing it up in class, joining clubs). Guest speakers in 2012 made a fund for student One Health projects, and several students led activities through that funding. Around 70% of respondents stated that the event increased their awareness of the importance of interprofessional collaboration "a lot". In focus groups, students reported that they were more enthusiastic and interested in working across disciplines. Additionally, the students reported increased self-belief in their capacity to lead change.	
Valentine et al., 2015	Students are nominated by the Department of Defense or Department of State, and then evaluated for readiness by the Certificate in	Single study	Certificate in One Health, obtained through participation in an intensive 18 day teaching period. Pedagogy includes didactics, small group problem		Alumni from 2008-13 were surveyed. Questions were either multiple choice or free-response.	Participants were asked the best way to keep in touch or network with fellow students, assessed if participants did so, and how. Also	When asked what would be an effective way of doing this, they suggested an email list serve or alumni website. 93% of survey respondents stated that they kept in touch with others, through Facebook, email, and others. 4% stated that they	

	One Health administrators. If there are unfilled seats, they are made open to more students.		solving, laboratory instruction, practical exercises, field work, and class discussions. Students are expected to complete a residential portion as well as an online course in environmental health. Certificate is fully funded.			asked if connections later led to opportunities or collaborations.	stayed in contact through attending conferences and meetings. 15% of those who stayed in contact reported that connections led to 'new opportunities or collaborations'.	
Vicente et al., 2022	April 29-July 1 2021. Students from universities in Brazil, Germany, Mozambique, and Kosovo joined the course (Federal University of Espirito Santo; Federal university of Parana; Ludwig Maximilian University of Munich; Technical University of Munich; Catholic University of Mozambique; Kolegii AAB)	Single study	Online course "Global Health Challenges and One Health". Included synchronous sessions and asynchronous activities. Applied the Collaborative Online International Learning method. Five modules total: - Interprofessional and collaborative practice in One Health - One Health concepts - Healthcare, surveillance, and One Health - Bioethics in One Health - Careers in global health Mainly evaluated through a joint project that aimed to address the health issues around AMR, Hepatitis, climate change, dengue, HIV/AIDS, and COVID-19.		Participants asked to evaluate modules using a Likert scale on importance of the topics covered and organisation. Also asked to answer open question about each module.		Students noted in open questions that they had difficulty understanding how to apply One Health from different professional perspectives, and from economic and political situations. They suggested increased use of case studies. Inclusion of a journal club and the use of the checklist for One Health Epidemiological Reporting of Evidence also showed students the importance of interprofessional collaboration.	
Visioli et al., 2022	3,858 learners from over 20	Single study	3-week online course (Nutrition,		Students provided feedback through an end-of-course		Participants stated that content was used to inform	

	countries. Open to students from any background, though 25% were medical students and 21% medical/healthcare professionals.		Health and Sustainability) design led by EIT Food and experts in the European Knowledge and Innovation Community. Topics included diet impact on health and disease, society, and environment. Course goals included: - Learning the fundamentals of nutrition - Understanding the importance of macro and micronutrients - Addressing nutritional needs through life, all through sustainability framework. Course is available in English and Spanish.		survey. Students could also provide feedback and discussion with each other on the FutureLearn platform.		personal consumer practices, inform practice with patients, and to inform community and public health advice. 74% stated that they applied information learned immediately after completing the course.	
Widmann et al., 2026	Winter 2024/25. Students of Witten/Herdecke University, Germany, and general public able to join. Many were students in health-related disciplines.	Single study	14-week lecture series with experts from medicine, ethics, veterinary science, law, and theology discussing human-animal relations and One Health, followed by open discussion. Lectures included interactive components (ie. polls and Q&A discussions). Also, a participant-driven workshop where attendees co-created the agenda was conducted. Public film screening and		Pre-/post intervention cross-sectional surveys used Animal Ethics Orientation scale. Students who joined at least 12/16 of the sessions were allowed to participate. Data analysed using SPSS. Descriptive statistics calculated separately for pre vs post intervention surveys and paired sample t-tests performed for each item. Also, Wilcoxon signed-rank tests were conducted as non-parametric measures. Assumptions of normality examined using	Assessment of student views on the interconnection of human, animal, and environmental health through questions adapted from K-12 One Health Education Survey.	260 pre-surveys and 159 post-surveys were retained for analysis after data cleaning. Means of responses increased across all 9 items assessing recognition of interconnection between animal/human/environmental health ("One Health" items).	

			quiz session was also part of the program.		Shapiro-Wilk tests.			
Zandavalli et al., 2024	August 2022 and January 2023. Professors and students of Basic-Clinical Integration 3 course were invited to take part. Federal University of Rio Grande do Sul, Brazil.	Single study	Planetary Health module in "Basic-Clinical Integration 3" course; courses uses the Actor-Network sociological lens. Implemented the educational guide "Patient and Clinic through the Lens of Planetary Health: Learning Guide for Health Education". Involved interviewing a patient and developing a patient portfolio through the lens of planetary health. Portfolio included drafting a network item with the patient at the center, and mapping the connections between factors in the case (psychosocial, air, hamillal, equity, etc.). Module also included of an IWN activity; a walk in university garden for class 1 and group sharing about moments where they felt interconnected with the planet for class 2.		Mixed methods, quasi-experimental; included closed (Likert scale) and open-ended questions. Closed questions adapted from Brazilian Pilot massive Open ONline Course in Planetary health Education. Qualitative data underwent Bardin's content analysis. Quantitative data analysed using Python. Student's T Test and Fisher's tests, for continuous and categorical data, used. Wilcoxon test conducted and biserial correlation calculation. Total 90 student responses and 9 professor responses included.	Assessment of student sense of interconnection with the environment.	Quantitative results found that students had a greater sense of connection to the environment. Qualitative results had findings that some some students are seeking to act collectively for sustem change.	

Table 3: Pedagogies of Educational Interventions

Paper	Intervention type (course, event, etc.)	Location	Online/ Hybrid/ Blended/ In person	Identified Educational Theory/ Approach	Discussion Components	Lecture Components	Activity and Assignment Components	Learning Outcomes
Acosta et al. 2024	Simulation activity in an undergraduate global health course.	Not reported.	In person.	Systems science, specifically simulations.	Students expected to strategize in discussions with peers.	None part of simulation. However, lectures in communicable and non-communicable diseases, neglected tropical diseases, global stakeholders, and One Health had been previously hosted through the course.	2 hour simulation. Student role playing national and state roles in a fictional crisis; goal to use different interventions to minimise the number of disability-adjusted life years. Students played the role of a Mayor, Senior Veterinary Officer, Senior Health Officer, or Senior Agricultural Officer. Students received document a week ahead of time detailing information for their state, or, if they were at the governmental level, all states. States requested funding and gave justification to the national level government, which then allocated funding.	Not reported.
Alvarez-Nieto et al., 2024	Series of scenario-based learning integrated into learning program.	Spain.	In person	Scenario-based learning; based on situated learning theory. Student-centred approach.	For the scenario, students discussed in groups of 4-5 potential directions for care and issues in assessment and case analysis. Teacher encouraged critique of proposed care and critical engagement.	Not reported.	Health and sustainability scenarios. Yr 2: scenario about asthmatic child. Yr 3: scenario about waste management in healthcare and bladder catheterisation, and one about complex needs for an older person and health risks of heatwaves.	Not reported.
Amberger et al., 2025	Elective course.	Goethe University Frankfurt, Germany.	Online and blended learning.	Transformative teaching approach. Based on multimedia design principles from Association of American Medical Colleges Institute's report "The Effective Use of Educational Technology in Medical Education".	Discussion a main goal of the class; flipped classroom structure.	Lectures by multidisciplinary experts were recorded and given out before hand ('flipped classroom').	Problem-based learning activities and role play simulations; making infographics.	1. Educate students on known climate change health impacts. 2. Encourage reflection on individual responsibility in promoting health with boundaries. 3. Develop capacity to implement transformational change.
Brar et al., 2025	Case-based medical rotation (4 weeks).	Dalhousie University, Canada.	In person.	Not reported.	At the end of the intervention, group	Orientation session on healthcare-climate change	Patient case analyses (chart review) to estimate GHG emissions associated with	Not reported.

					discussion was facilitated on healthcare contributed emissions and how to manage those emissions better.	relationship, sustainability, HealthcareLCA Database, and the project itself.	healthcare. Creating presentation on case analysis; presenting to other residents.	
Chiu et al., 2019	Student led 4 hour workshop	Colorado State University, U.S.	In person	Not reported.	Not reported.	Didactic lectures at the beginning of the event to enable understanding of the various disciplines.	Fictional enzootic outbreak case. Students worked to investigate and address the cause through multidisciplinary lens.	1. An finding simu 2. D to th scen their 3. D imp mult appr disea
Clery et al., 2021	Sustainable Quality Improvement Workshop.	Bristol Medical School, U.K.	Online.	Not reported.	Not reported.	Lectures included case studies of local quality improvement projects. Lecture topics included: impacts of climate change on health, impact of healthcare on climate change, link between sustainable healthcare and QI, applications of QI, and others. Full list Fig. 2.	Activities facilitated through break-out rooms and communal online whiteboard. Annotating a quality improvement Process Map. Idea generation for a SusQI project. PDSA template project plan.	Not r
Dumm et al., 2023	Lecture series; credited as an elective at several universities	German speaking medical schools in Europe.	Online.	Not reported.	Not reported.	11 lectures by experts invited based on academic background; interactive class components (ie. surveys) and case studies included. Content was largely based on the Guidelines for Nutrition Therapy in Clinic and Practice (LEKuP). Supplemented by SDGs, EAT Lancet Commission publications, and public health nutrition topics.	Not reported.	Not r
Habermehl et al., 2026	Longitudinal course with 2 immersions.	University of Colorado, U.S.	In person field components and online	Constructivist learning Interdisciplinary and Systems	Small group discussions in response to book club reading and	SEAOHN One Health modules were part of the asynchronous learning	Immersion activities (visits to community-based sites); Field visits and clinical integrations as part of several learning	Lear base comp - Co One

			asynchronous learning.	thinking. Theory of experiential learning. Communities of practice. Transformative learning.	immersion activities.	activities. Didactics as part of the immersion learning activities.	activities. Role play, reflections, and simulations as part of several learning activities. Independent learning activities: book club, journal club, and attendance of any 5 interdisciplinary One Health events.	and fund infect - Ex learn colla partn ecos infect man - Tr learn ethic - Sit learn of pr colla partn advoc regul - Sy colla partn syste epid risk
Kinnison et al., 2023	2 MSc programs (Veterinary Epidemiology and Public Health, Livestock Health and Production) and a Vet Ed course	Faculty of Veterinary Medicine and Animal Science, University of Peradeniya, Sri Lanka and Royal Veterinary College, U.K.	Blended learning.	Not reported.	Courses include interactive discussion forums. Tutor-led asynchronous tutorials also make use of the discussion forums.	Three core and four optional online modules, as well as 5 days of in-person workshops at the beginning and end of the program.	Activities can be tailored to the local context.	Not r
Lemke et al., 2023	Elective course	Goethe University Frankfurt	Blended learning.	Not reported.	Discussion and small group work incorporated into lectures.	Online lectures and podcasts covered the main topics: - Introduction to planetary health and geoscientific background to climate change. - Adaptation: links between influence of climate and health, and implications for patient care. Focus on heat. Allergies and air pollution, infectious disease, and mental health were additional topics. - Mitigation: CO2 footprint of healthcare system and ways to reduce to	Not reported.	Not r
Mainey et al., 2024	Sequential simulation intervention.	University of Greenwich and University of Essex.	In person.	Sequential simulations.	Not reported.	Not reported.	- Students first reviewed sensitising materials. - Students acted as nurses in clinical	Not r

							situation with environmental health factors as play. Scenario followed by teaching session on advocacy and political action. - Community dialogue simulation to decide on collective political action to establish access to clean water or air. - Governmental simulation where Students provided recommendations to nurses intending to peacefully protest."	
Marwah et al., 2024	Curriculum integrated into advocacy curriculum, delivered during 2-week blocks between clinical rotations.	Children's Hospital of Philadelphia Pediatrics Residency Program, U.S.	In person.	Not reported.	Not reported.	Not reported.	"Climate Change and Pediatric Health": Attendance at conference teaching skills for interpretation of environmental indices and discussion of climate topics with patients and families. "Climate Justice and Narrative Medicine Advocacy Workshop": workshop on drafting climate-related clinical narratives.	Not r
McKeown et al., 2025	Workshop included in mandatory 3rd year course in Anatomy and Developmental Biology major.	Major Australian higher education institution.	In person.	Workshop design: - Co-designed with students. - Aimed to incorporate Indigenous perspectives; Aboriginal Larrakia and Wadjigan colleague reviewed the materials.	Activities were based around student discussion.	Not reported.	Students worked in groups through activities reviewing developmental curriculum: - Activity 1: identifying environmental factors affecting individual developmental health; ethanol and bisphenol A suggested as factors - Activity 2: identifying environmental impact of previously identified factors. Professor encouraged students to identify positive actions to address issues. - Activity 3: considering Indigenous perspectives for making biomedical practice more sustainable.	Not r
McLean et al., 2022	Assignment in a medical curriculum with planetary health integration (ie. eco-	Bond University, Australia.	In person.	Learner-centeredness - Teams are formed and leader is elected - Students choose	Not reported.	Not reported.	Students choose their own groups of 4-6. Students ideate a product to address a planetary health issue they select, incorporating SDG13 and	Not r

	biopsychosocial Model of Health and Wellbeing, sustainable healthcare). Assignment is worth 10% of the grade of 2nd years in the program.			their issue of focus, product audience, and the SDG of focus other than SDG13 - Decide on how message will be delivered SDGs and Ecological justice: - Indigenous perspective on planetary health is taught at Bond University. - Application of Aboriginal and Torres Strait Islander Social and Emotional Well-being Framework and Indigenous First or Natural Laws. - Application of SDGs means recognition planetary health is impossible without recognition of social marginalisation.			one other of their choice. Students create: - Product proposal (4% of final grade) - Product (5% of final grade) - Reflective critique (1% of final grade)	
Merduaty et al., 2025	Course "Nursing Perspectives on Climate Change". Part of Bachelor of Nursing, but other students could take the course as an elective.	Universitas Indonesia.	Hybrid.	Course designed through Design-Based Research framework: - Focus: stakeholders in sustainable nursing education were brought together for consultation (educators, students, policymakers, etc.) - Formulation: review of global climate and health education initiatives - Contextualisation: needs assessment of students and educators conducted through focus groups. Final year nursing student joined the team as a student co-designer. - Definition: curriculum plan was finalised. -	Formative assessments included making constructive posts to other students.	International guest lectures often invited.	Debate participation worth 30% of grade. Project presentations worth 25% of grade. Photovoice assessment and presentation replaced critical literature review after student feedback.	Not

				Implementation: piloted; feedback received from students. -Evaluation: feedback from students and instructors.				
Moro et al., 2022	Planetary health fact added to each lecture of a first-year physiology course, as well as link to further resources.	Australian university.	Not stated.	Not reported.	Not reported.	Planetary Health facts included were relevant to the lecture subject matter and was inserted in bottom left hand corner of the slide and noted by the educator without further discussion.	Not reported.	Not reported.
Oljans & Mickelsson, 2025	Two one-day participatory research workshops at two universities aiming to explore AMR education.	Midlands State University, Gweru University of Zimbabwe, Harare	Not stated.	Not reported.	After small group discussions, groups came together to reflect in a joint plenary.	Not reported.	Educators and students from various fields worked together on AMR case vignettes in the Zimbabwe context. Vignettes presented; participants then discussed among themselves how to address the situation.	Not reported.
Park et al., 2023	Interprofessional case study activity part of several courses.	University of Illinois, U.S.	Online.	Not reported.	Post session, all groups came together to share problem solving approaches.	Views of different stakeholders presented using PowerPoint and video clips.	Interprofessional case study on a diarrhea outbreak from a manure-contaminated water supply, due to extreme flooding. Students interacted with other students from public health, medicine, and veterinary medicine.	Not reported.
Ramkumar et al., 2021	Standardised patient case (SP case) included as part of an OSCE (Objective Standardised Clinical Evaluation).	University of Illinois, U.S.	In person.	Not reported.	Not reported.	Not reported.	Case involved the health impacts of wildfire smoke on a 65 yr old female patient with asthma. Faculty instructed to guide students to understand the psychosocial elements of patient condition. Cohort 1: students interviewed and physically examined the patient in a group. Afterward, faculty gave feedback, explained patient vulnerability to wildfires, and discussed mitigation and adaptation approaches. Cohort 2: students interviewed and physically examined the patient in pairs. Students were then expected to synthesise the data in a note. Students received verbal feedback and then met with faculty	Not reported.

							individually for debriefing.	
Ruiz de Castaneda et al., 2018	Five day programme; selected participants from an MOOC were given a grant to travel.	Geneva and Basel.	Not reported.	Not reported.	Not reported.	Learners attended lectures from different experts.	Learners pitched projects and formed teams for 4 out of the 12 pitched projects. Learners produced research deliverables and gave final presentation to experts from academia and the WHO.	Not reported.
Schwind et al., 2016	6-7 week intensive summer institute.	Not reported. Institute held in collaboration with organisations from many countries.	Not reported.	Immersion style of education.	Not reported.	Lectures on relevant topics.	Immersion style of education included the following components: - Laboratory projects - Field demonstrations - General hands on experience	Not reported.
Shearer and Kniel, 2026	Escape room activity on foodborne disease outbreak.	University of Delaware, U.S.	In person.	Case-based and problem-based education. Gamified education.	Not reported.	Instructors give brief introduction on food safety and directions.	Students interpret data from each phase of the investigation to generate a code that unlocks the room. Phases of the investigation involved professional roles in public health, environmental monitoring, and more, as well as epidemiological, laboratory, environmental survey, and other concepts. Once lock is opened, students are given questions about the interconnectedness of the difference investigation phases.	1. Clinical impact of illness. 2. Identification of involved professionals. 3. Identification of foodborne outbreak investigation data. 4. Identification of professional and interdisciplinary support.
Ssekamatte et al., 2022	Capacity-building programme co-hosted by	Cohorts from Makerere University and Mbarara University of	Not stated.	Not reported.	Not reported.	Theoretical courses on: - Collaboration and partnership - One Health	Field experiential learning was included in the program. Program provides One Health resident training.	Not reported.

	universities across Africa.	Science and Technology.				- management - Culture and ethics - Behaviour change - Communication - Leadership - One Health outbreak investigation - One Health systems thinking - Risk analysis - Policy and advocacy - One Health research - One Health principles and concepts - Infectious disease management - Gender and One Health - Epidemiology - Ecosystem health	Aims to build competencies through graduate fellowships, undergraduate innovations, One Health student clubs, and MSc. scholarships.	
Stevens et al., 2024	Collaborative serious game in public health course for medical students.	Erasmus Medical Center, Netherlands.	Not reported.	Not reported.	Part 2 of th activity: group discussion and reflection of person and professional responsibilities, either within the smaller subgroup or with the whole group. Discussion was structured to involve several themes: emotions, vulnerabilities, and responsibilities.	45-minute introductory lecture on planetary health was previously given during the course.	Two hour 'serious game' intervention embedded in an introductory public health course for third year medical students with an introductory lecture on planetary health. Included: - An introduction to the game by the instructors - Part 1: linkages between climate change and health were discussed by students in smaller groups. Game involved cards showing how human activities led to climate change and eventual social and health impacts. Focus of game shifted from individual health to societal impacts (ie. migration) from rounds 2-4. Instructor role was to offer directions and ask further questions.	Not
Uehlinger et al., 2019	3 day event, OHLE (One Health Leadership Experience), held annually.	University of Saskatchewan, Canada.	In person.	Not reported.	General event design to facilitate discussion: round tables used for meals and morning presentations, and students were assigned to tables to facilitate discussion across colleges.	Planetary presentations on the second day by guest speakers.	See case study discussion.	1. In Heal USAs stud 2. S stud with lead acro scien 3. E stud Heal chan

					Case study discussion: students reviewed a scenario and joined smaller groups of 10-12. Each case study was facilitated by a faculty One Health leader. After discussion, one student presented case discussion to plenary session. Leadership discussion: on day 3, guest speakers had a panel discussion to provide leadership lessons. Students then joined new groups and discussed questions on leadership.			
Valentine et al., 2015	One Health certificate.	University of Florida, U.S.	In person and online.	Not reported.	Discussion of One Health-related videos.	Residential portion includes didactics. Students are expected to complete an online course in environmental health as well as the residential portion.	Laboratory instruction, small group problem solving, practical exercises, field work.	Not reported.
Vicente et al., 2022	Course.	Online; hosted by Joint Initiative for Teaching and Learning on Global Health Challenges and One Health, involving universities from Brazil, Germany, Mozambique, and Kosovo.	Online.	Collaborative Online International Learning (COIL) method.	Not reported.	Five modules total: - Interprofessional and collaborative practice in One Health - One Health concepts - Healthcare, surveillance, and One Health - Bioethics in One Health - Careers in global health	Included asynchronous activities via the Moodle platform. Group activities included a case study of interprofessional teamwork, a journal club based on Davis et al. (2017)'s criteria, and a debate on mandatory vaccination.	Not reported.
Visioli et al., 2022	Nutrition, Health, and Sustainability course.	Online; students came from around the world.	Online.	Not reported.	Discussion between students on the online platform was encouraged by posting	Not reported.	Not reported.	1. Leadership 2. Fundamentals of nutrition 3. Understanding the impact of food and nutrition 4. A healthy diet

					prompting questions.			through through frames
Widmann et al., 2026	Course.	Germany; classes held online and made broadly available afterward on YouTube.	Online.	Not reported.	Incorporated open Q&A discussions.	Digital lectures given by interdisciplinary lecturers (ie. law, ethics, medicine, theology, veterinary science.)	Participatory Barcamp workshop/"unconference" where attendees co-created conference agenda and worked in small groups on self-selected topics conducted. Public film screening: Die Q ist ein Tier	Not t
Zandavalli et al., 2024	2-3 class course module.	Brazil.	Not reported.	Teaching approaches developed based on Actor-Network Theory. Based on the educational guide Patient and Clinic through the Lens of Planetary Health: Learning Guide for Health Education, which in turn built on the 5 domains noted by the Planetary Health Educational Framework.	In the last class of the module, students were asked to present their portfolios and discuss them.	Pre-recorded planetary health lecture was included in CLass 2 (Jan 2023).	Students put in groups to interview a patient in the university hospital and develop a portfolio through Planetary Health lens. Portfolio included making a network diagram around the patient, and the connections to different Planetary Health keywords. Interconnection with nature activities also included, including a walk in the university garden (Class 1) or sharing within the group a photo/account of a time they felt interconnected with the planet (Class 2).	Not t

Table 4: Educational Intervention Results

Paper	Professional /Academic Behaviour Change	Personal Behaviour Changes	Quantitative Recognition of Systems Connections	Qualitative Recognition of Systems Connections	Student Action/Network Building Planetary Health Promotion	Feedback on pedagogies	Other notes
Acosta et al. 2024	Not reported.	Not reported.	Not reported.	a) Interactive strategy seen as highly effective in understanding the complexity of global health, especially compared to lecture based studies. Students were able to effectively prioritise issues and compare interventions	Not reported.	Students enjoyed having an activity where they had the freedom to act as public health professionals. Students were able to think 'outside the box' without risking their grade.	

				using a systems thinking approach (ie. discussing various possible scenarios). b) Improved understanding of health connections with other disciplines (ie. health and agriculture). Understanding of how societal power dynamics affect health, as well as the challenges that the global aspects of the issue raise.			
Álvarez-Nieto et al., 2024	Increased sustainable applications at work after Yr 4. Nonsignificant increase in willingness to challenge unsustainable work practices, as well as sense that student could not challenge unsustainable practices in the workplace.	Decreased sustainability applications at home.	Not reported.	Not reported.	Not reported.	Not reported.	
Amberger et al., 2025	Post-intervention, most students responded 'agree' or 'strongly agree' to	Significant increase in sustainable behaviour.	Significant increase in student awareness of health impacts of climate change.	Not reported.	Significant increase in agreement for statement "I can make a positive contribution	Not reported.	

	questions about sustainability attitudes in the workplace (ie. "I can imagine bringing up the connection between climate change and health with patients"; "as future physician, I can contribute to the sustainability in the health sector").				towards climate protection".		
Brar et al., 2025	83% of participants intended to change their healthcare practice to be more sustainable.	Not reported.	Not reported.	Not reported.	Not reported.	Not reported.	Challenges: high workloads result in Planetary Health teaching being de-prioritised.
Chiu et al., 2019	Not reported.	Not reported.	No significant change in perceived importance of cross-discipline collaboration or topics like disease ecology, molecular phylogenetics, etc. However, mostly self rate 10/10 prior to assessment. Significant increase in perceived importance of pathology and general knowledge of all topics.	Not reported.	Not reported.	Positive feedback on didactic lectures.	
Clery et al., 2021	Increased self-rated likelihood to reduce their environment	Not reported.	Self-reported knowledge of health impacts of climate change increased significantly post-	Not reported.	Students requested support for or actively attempted to undertake	Not reported.	

	tal impact in future jobs.		session (from 23.4% to 74.8%).		Sustainable Quality Improvement project. Number of students who intended to undertake a QI project increased from 58.6% to 81.8%. Two students attempted to undertake SusQI projects but were interrupted by the COVID pandemic. Personal and institutional barriers also prevented action.		
Dumm et al., 2023	Not reported.	Not reported.	No significant difference between participants and control group in awareness of links between nutrition, health, and climate change. However, both groups had high self-rated awareness (median 1.67 on Likert scale of -2 to 2). Significant increase in climate change awareness.	Not reported.	Not reported.	Not reported.	
Habermehl et al., 2026	90.6% reported that knowledge gained helped students to integrate concepts from other parts of the medical curriculum	Not reported.	100% of 2026 cohort reported a clearer understanding of climate change effects ecosystem/human/animal health. 100% of students reported an improved understanding of the role of organisations such as the CDC (Centre for Disease	Reported more understanding of how different industries visited affect planetary health.	100% of students reported more confidence collaborating with interdisciplinary professionals on public health, although	Immersion activities identified as the most impactful part of the course.	

	and improve patient care.		Control and Prevention) in maintaining public health.		article did not specify examples. 81.7% of both cohorts reported feeling empowered to address community health challenges through a One Health lens. 100% of future physicians in the 2026 cohort recognised ways to advocate for communities at bedside, local, or national levels.		
Kinnison et al., 2023	Students felt that they could educate their clients on public health and animal welfare.	Not reported.	Not reported.	Not reported.	Program supported general career development and collaborations (ie. some students became visiting lecturers or joining the Ministry). This led to published papers. Some students were members or presidents of country-wide associations, where they shared their knowledge.	Internet access and adjusting to self-directed learning listed as challenges.	A participant in a VetEd course collaborated with staff from both institutions to write a grant for a clinical skills laboratory.
Lemke et al., 2023	Increased ability to discuss	Increased agreement for the	Increased understanding of the	Not reported.	Not reported.	Not reported.	

	climate change and health in patient interviews, though willingness to do so not measured.	statement that every individual can make a positive contribution to the environment. Increased agreement for 'beginning to live sustainably'. Students did not significantly increase in 'thinking about a sustainable lifestyle'.	health consequences of climate change.				
Mainey et al., 2024	- Nurse Professional Values Scale (caring, activism, and professionalism) significantly increased	Not reported.	Not reported.	Not reported.	- Political Efficacy-Short Scale (belief of influence over politics) significantly increased - Perceived Political Self-Efficacy Scale - Short Form (confidence to take part in representative democracy) - Social Justice Scale (social justice attitudes and intentions, ie. for engagement)	Not reported.	

					significantly increased - Environmental Locus of Control Scale (belief of control over environmental outcomes) significantly increased		
Marwah et al., 2024	- More intention to discuss the health impacts of climate change with patients. - More intention to consider sustainability in day-to-day practice.		- Increased self-reported understanding of how climate change impacts human and patient health. - Increased self-reported understanding of how climate change affects health inequities.		Not formally analysed. However, authors report that a resident published a session-inspired editorial about climate change and migrant health.		
McKeown et al., 2025	- Readiness to address environmental impact of healthcare and advocate for planetary health increased. - Post-intervention action not evaluated.			Not formally evaluated; results are based on the student notes collected. - Activity 1: diet and ethanol noted as environmental health factors. Cultural role in prevalence of these factors considered. - Activity 2: resources used and waste created in ethanol production considered. Company carbon reduction efforts and			

				country alcohol restrictions noted as efforts to reduce impact. - Activity 3: students suggested more sustainable approaches to science. Additionally, suggested increased collaboration with Indigenous groups and considering interconnectiveness of health at different ecosystem levels.			
McLean et al., 2022	83.8% of students reported that intervention made them "aware of future role as a health professional, ie. advocacy, education about environmental factors affected health".	83% of students reported that intervention made them think about how to personally reduce their environmental footprint.	83.1% of students reported being more aware of environment and health relationship.	Most SDGs selected for focus were SDG12 (Sustainable Production and Consumption), SDG3 (Health and Well-being) and SDG6 (Clean Water and Sanitation). Projects on SDG6 specifically usually related to Indigenous communities in remote Australia, most impacted by water issues. Products were generally targeted at	80.8% of students reported that intervention developed their teamwork and problem-solving skills.		

				local, state, or federal governments; healthcare professionals, and the public.			
Merduaty et al., 2025				Paradigm shift in attitudes to climate change: - Students previously perceived climate change as a natural phenomenon, and then came to recognise the human role in this. - Students came to recognise the role of climate change in human health. Knowledge and collaboration in climate action: - Students previously did not realise that climate change is a responsibility across disciplines and professions.		Debate prompted deeper engagement with the topics. Photovoice also supported understanding more perspectives.	
Moro et al., 2022	One student said they were "More cautious about waste in the lab".	Not reported.	Not reported.	50% of respondents said that action, behaviours, or thoughts had changed due to the intervention.	Not reported.	Not reported.	One students who stated that actions, thoughts, and behaviours had not changed said it was because they

				Students noted becoming more conscious about the environmental impact of medical field.			were already aware of many planetary health issues.
Oljans & Mickelson, 2025	Not reported.	Not reported.	Not reported.	Learners recognised social factors affect AMR spread and antibiotic usage, and the responsibility for AMR lying with both government, farmers, and others in society. Learners also recognised the varied pathways through which AMR can occur.	Not reported.	Not reported.	Not reported.
Park et al., 2023	Not reported.	Not reported.	Significant increase in student awareness according to Likert scale pre/post test ratings. Questions included asking about student awareness of water and public health, flooding consequences for health, and interprofessional nature of case.	Not reported.	Not reported.	Not reported.	Not reported.
Ramku mar et al., 2021	Students noted in qualitative responses that they would incorporate learnings into gathering patient	Not evaluated.	Cohort 2, but not 1, showed significant increase in post-test compared to pre-test. Likert scale questions assessed student awareness, knowledge, and ability to educate others on the impact	Not evaluated.	Not evaluated.	Not reported.	Not reported.

	histories in the future and the climate/home health quality measures that affected health.		of climate change on health.				
Ruiz de Castane da et al., 2018	Not evaluated.	Not evaluated.	Not evaluated.	Not evaluated.	Most students intend to continue working on their projects. Group working on Project A intends to publish their potential results.		
Schwind et al., 2016	83% stated that Envirovet helped the students incorporate principles of ecosystems health in their professional position.	Long term, 17% felt that the programme guided career decisions or guided sustainable lifestyle choices	35% of respondents stated that they approached personal and professional situations with more knowledge and recognition of the interconnectedness across health sectors.	Not evaluated.	19% pursued more experiences (ie. work or research) in ecosystem health as a result of intervention . 20% sought further education on the topic. 9% stated that the experience helped them maintain a network of people with similar interests. 24% stated that the program influenced their eventual career choice. 16% stated that		

					Envirovet motivated them to pursue further training in ecosystem health.		
Shearer and Kniel, 2026	Not evaluated.	Not evaluated.		Recognition of different aspects influencing food production and safety recognised in post test open-ended reflections.	Not evaluated.	23% of students who completed the activity in groups stated that the team component was the most "enjoyable" aspect of the the investigation.	
Ssekamutte et al., 2022	30% of alumni reported applying One Health activities in their current professional role, ex. the fieldwork skills learned, ex. through community sensitisation . Knowledge of multidisciplinary approaches was also crucial in working with those from other backgrounds (ie. environment) in their jobs.	Not reported.		Knowledge of multidisciplinary approaches was also crucial in working with those from other backgrounds (ie. environment) in their jobs.		Not reported.	Challenges to applying cross-sector learnings in the workplace: Organisations with existing partnerships with other groups/disciplines and focused on cross disciplinary issues enabled One Health applications. Participants observed that limited knowledge of One Health and negative attitudes to working with others limited the organisation's applications of One Health.

Stevens et al., 2024	Not reported.	Based on focus group results: following the intervention, students seemed to think more about small sustainable actions they could make in their daily lives. But they also felt individual actions were inefficient, felt more climate worry, and felt more despair. Immediate behaviour change did not seem to occur in the weeks between the activity and focus groups.	Significantly higher knowledge score about climate change vulnerability and inequity, knowledge about personal actions that can reduce learner carbon footprint, effects of climate change on health, and the ways that climate change affect vulnerable groups. Knowledge of indirect health effects of climate change scored lower, but not significantly (p = 0.02).	Focus group participants noted that they felt participation in game enhanced their understanding of the climate change-health relationship. Participants also came to recognise climate burden inequity.		Active engagement (through placing the cards) as helpful to understanding systems complexity. Seeing cards showing climate change effects laid out on the table increases realisation of the urgency of climate change. Previous base knowledge from the introductory lecture seen as necessary to be able to contribute during the discussion.	
Uehlinger et al., 2019	Post intervention, students stated they expected to interact with a median of 7 professions outside of their immediate field. No pre-test comparison.	Not reported.	Not reported.	In focus groups, students stated that they were more confident in ability to collaborate with those in other disciplines.	77% (2012 cohort) 70% (2013 cohort) and 71% (2014 cohort) of students stated that they had "gained the knowledge.. the help move OH forward with		

	In focus groups, students stated that One Health was tied to their career and integrated into their healthcare decision making process.				students in their college". 26.4% of past attendees stated that they had initiated activities and discussions related to One Health in courses or other campus environments. 2012 OHLE: guest speakers initiated a fund for One Health projects. Several student activities were funded through this. Most (74.5%) students did not indicate any challenges faced in their efforts to become change agents for One Health. Difficulties that were reported related to heavy course, limited faculty support, and perceived resistance to interdisciplinary activities.		
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Valentine et al., 2015	21% of respondents reported receiving funding after the program, 11% applying for funding, and 68% not applying for funding. 28% reported 1 or more publications, 7% manuscripts under review, and 65% no publications. 33% reported enrollment or graduation from an advanced degree program, 15% were planning on pursuing higher education. 7% of respondents reported that credits from the certificate transferred to their advanced degree. Students were not asked how the certificate affected their likelihood of pursuing further education.	Not reported.	Not reported.	Not reported.	93% of students stated they had stayed in touch with other students. 15% of those staying in touch reported that their connection had led to new opportunities. Respondents suggested that an email list serve, Facebook, or an alumni website would be a good way to stay in touch.	Students reported curriculum/content, instructors/teaching methods, international diversity of learners, field work, and online learning as strengths of the certificate program. Student reported weaknesses included compressed schedule, online course, lack of follow-up, content difficulty, and logistics/travel.	Fully funded program targeting students from developing countries. Potential students are nominated by the DoS or DoD (Department of State or Defense).
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Vicente et al., 2022	Not reported.	Not reported.	Not reported.	Interprofessional participation improved attitudes toward interprofessional collaboration. Some students mentioned that they had difficulty understanding how to apply One Health from the perspective of different professions to every-day, political, and economic scenarios Using Checklist for One Health Epidemiological Reporting of Evidence showed students the importance of breaking professional silos and improving interprofessional collaboration.	Students mentioned finding common research interests and considering collaborating in the future.	Synchronous group activities (debate, journal clubs, and case studies) were noted as high impact.	Course had a 63.3% completion rate. 11 dropped out due to workload, internet connection difficulty, personal issues, and poor language skills.
Visioli et al., 2022	74% of students stated that they applied course information immediately after completing the course. Students stated that content was used to inform patient engagement , public	Participants reported using content to inform their consumer practices.	Not evaluated.	Not reported.	Not reported.		

	health advice, and potential treatments.						
Widman et al., 2026	Not reported.	Not reported.	Means of responses increased across all 9 items assessing recognition of interconnection between animal/human/environmental health ("One Health" items).	Not reported.	Not reported.		
Zandavalli et al., 2024	Students reported increased ability to guide "individuals" about the health relationship between them and the environment. Students stated that they also recognised their role in reducing the environmental footprint of the healthcare system.	Students reported rethinking their habits.	Significant increase in sense of interconnection with the environment and importance of physicians applying Planetary Health. No significant changes in perception of climate change impact on health, climate change concern, and importance of the topic for the health field. Significant increase in number of students who recognised the association of various health problems as associated with environmental change.	Not reported.	Qualitative discussions reported that, while "to a lesser extent" than other themes, students saw their own potential to contribute to changes in society through their professional role and act collectively for systems change.		Students reported that timing of the lessons was not ideal due to requirements from other planetary health activities.