

One Health education should be early, inclusive, and holistic



The 19th century pathologist Rudolf Virchow was distinctive in his emphasis on multifocal and transdisciplinary thinking about the determinants of health and disease. Most famously, he wrote a groundbreaking report for the Prussian Government on the 1847–48 typhus outbreak in the region of Upper Silesia, advocating free and unlimited democracy as the single most important principle in addressing the epidemic.¹ As an advocate for system change to address health inequities, Virchow has been described as a pioneer of One Health: the idea that the health and wellbeing of human and animal populations and environmental systems are complex interconnected occurrences shaped by biosocial contexts.²

The Sustainable Development Goals (SDGs) provide a set of rich outcomes that capture the One Health challenges arising from these interconnected systems.³ Achieving the SDGs will require capacity building to elicit transdisciplinary knowledge integration combined with codesign and solution implementation at the local, national, regional, and global levels. Unfortunately, most training in One Health occurs within medical and veterinary programmes after at least 3 years or more of prerequisite study^{4,5} that, itself, promotes and rewards discipline-specific mental models. We argue that the development of proficiency in One Health thinking and methods is impeded by previous acculturation into such professional silos, and that bioscience focused One Health education tends to exclude students from other disciplines, undermining development of transdisciplinary approaches to address the SDGs.

We advocate that One Health education must go beyond medical and veterinary students and begin earlier than postgraduate programmes. Transdisciplinary thinking and collaboration are best learnt within truly diverse student cohorts, inclusive of science, technology, engineering, mathematics, and medicine, as well as humanities, arts, and social sciences. It is in such mixed classes that disciplinary thinking, world views, life experiences, cultural backgrounds, and knowledge systems can be shared. This early and inclusive approach has been implemented at undergraduate level at the University of Melbourne through a sequence of two University breadth courses.⁶ University of Melbourne's undergraduate students are required to study breadth

subjects from outside their home faculty to develop a broader set of skills than those typically available within their field of study. The breadth topics are a special category of such subjects, designed for learning complementary ways of thinking about issues and problems, and challenging students' perceptions.⁶

The two Our Planet, Our Health courses began in 2018 with a first year offering introduction to the One Health concepts and agenda.⁷ A second-year course commenced in 2019 and integrates these concepts, within a system thinking framework, via extensive use of case studies.⁸ The courses use collaborative, group-based active learning activities, including site visits and gallery-based tasks, to promote student exploration of the weekly One Health themes, supported by presentations from a diverse range of cross-disciplinary guest experts. Diverse and inclusive types of knowledge are integrated throughout the curriculum including Australian Indigenous knowledge, law, politics and government, economics and trade, and social science, as well as the traditional bioscientific approaches including epidemiology, microbiology, and ecology. Subject teachers are drawn from multiple professional, cultural, linguistic, age, gender, and First Nations backgrounds.

As of December, 2021, these courses have enrolled a total of over 600 domestic and international students, predominantly women, who are already enrolled in other degrees, such as Science and Fine Arts (figure). To date, our approach to delivering early, inclusive, and holistic One Health education to such a diverse undergraduate cohort appears globally unique.

Based on our teaching experience, we propose that, to acculturate planetary level thinking, One Health education should start early in the undergraduate years and draw upon multiple teaching traditions and knowledge systems to create an effective reinforcing cycle of transdisciplinary thinking and holistic approaches. This will maximise the inclusiveness and diversity of student groups and promote holistic conceptions of One Health beyond pathogen centric science.³ For example, we make explicit the strong linkages between One Health thinking and indigenous concepts of caring for the country,¹⁰ and the fundamental importance of place-based and non-human kinship systems. In implementing this new

For more on the Sustainable Development Goals see <http://www.un.org/sustainable-development/sustainable-development-goals/>

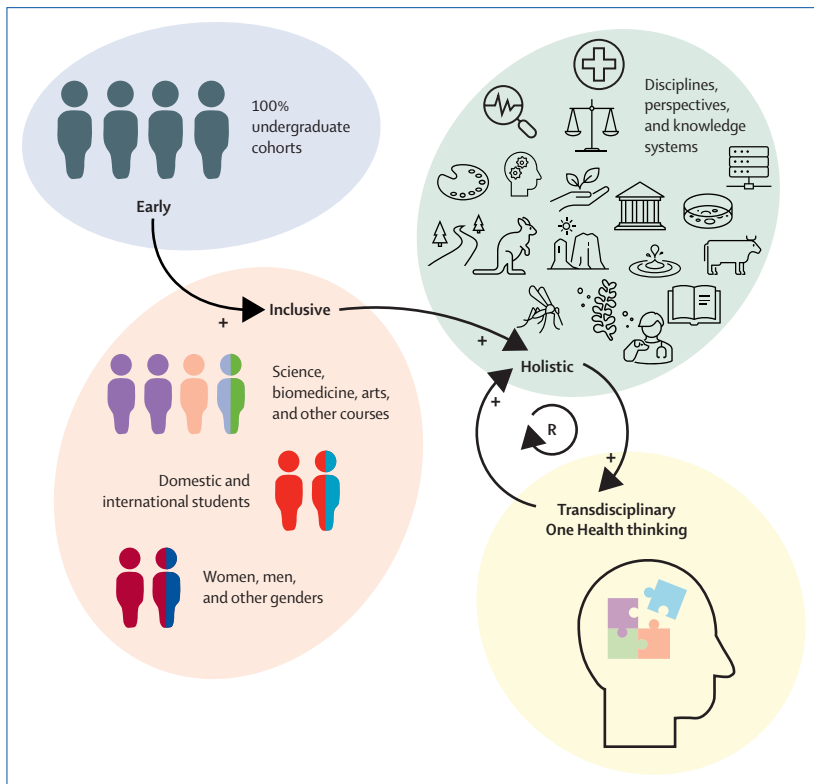


Figure: The early, inclusive, holistic One Health model of education
 Using classic system thinking principles,⁹ we highlight the benefits of the One Health model. The earlier One Health education is incorporated into a University curriculum, the more inclusive and diverse the cohort of students, given the absence of stiff disciplinary silos and mental models. Consequently, students are open to examine and learn holistic approaches to One Health problems. This approach results in an effective reinforcing cycle (R) in which newly formed transdisciplinary One Health thinkers permanently explore, assess, and incorporate diverse approaches into their problem-solving toolbox.

model of One Health education, we also attract diverse and highly engaged students who enthusiastically confront One Health challenges.

200 years after his birth, we still follow in the footsteps of Virchow who distilled, in his 1848 report,¹ the essence of the public and planetary level health challenges we face and the multifocal lenses needed to solve them:

“For let us be perfectly clear, we are confronting the fundamental problem of attempting to understand those factors which have made us what we are, and which will determine our future. We have often referred to ‘the scientific method’, we now find that through applying it, we have moved from medicine into the social field, and in so doing, we have had to consider some of the fundamental issues of our times.”¹

We declare no competing interests.

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