

Embedding co-designed planetary health curricula in Pharmacy: An investigation of impact on student understanding and engagement

Zachary Cobucci, Perri Teoh, Mia Curigliano, Talia Raman, Alexandra Steel, Aisling M McEvoy, Catherine Forrester, Liza Barbour, Suzanne Caliph & Angelina Lim

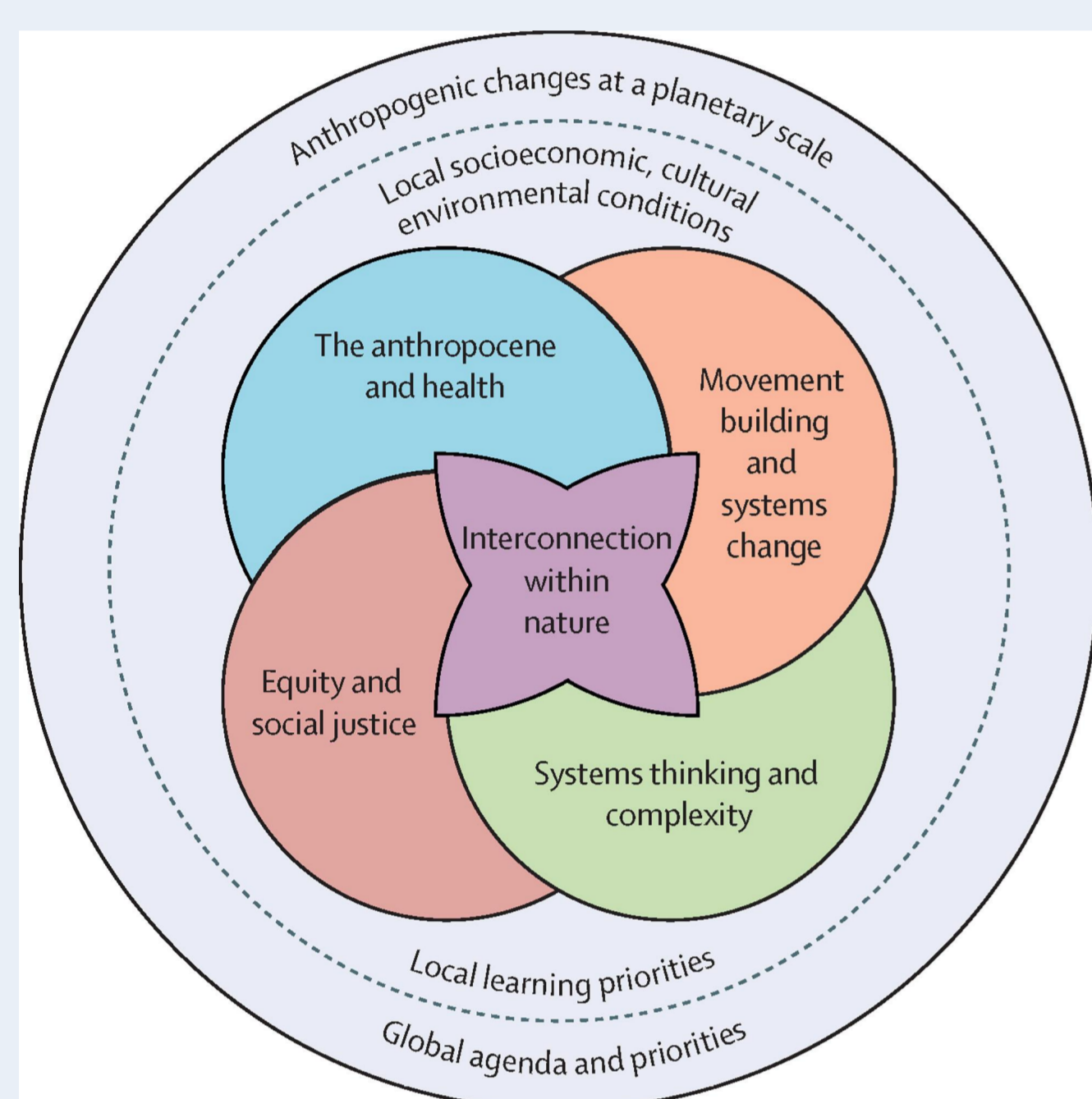
Faculty of Pharmacy and Pharmaceutical Sciences, Monash University

INTRODUCTION

Planetary health is an important concept for emerging health professionals to grasp considering the unique challenges posed to current and future generations. In the field of infectious diseases, antimicrobial resistance (AMR) is recognised by the World Health Organisation as among the top 10 global public health threats currently facing humanity¹. Inappropriate antimicrobial use and disposal is a major contributor to planetary health crises, and further exacerbates environmental damage through agricultural runoff, manufacturing emissions and biological excretion.

Tertiary institutions are uniquely positioned to lead the transformations necessary for a more sustainable and healthier future by embedding planetary health education (PHE) into their health professions' degrees. Despite this, very few health disciplines, including pharmacy, are adequately equipping their future workforce with best-practice PHE. Limited literature exists regarding the application of the PHE framework^{2,3}.

Greater integration of PHE into tertiary education is crucial to ensure future health professionals are equipped with the skills, knowledge and provocation to address the human health impacts of environmental change in their practice, and to bring about broader change among patients.



AIMS

- (1) To develop, implement and evaluate a planetary health infectious diseases curriculum using a student-led co-design process.
- (2) To utilise the Planetary Health Education Framework to evaluate student understanding and engagement.

Figure 1. The Planetary Health Education Framework³ published in the Lancet by the Planetary Health Alliance.

METHOD

This research followed a case study design and was implemented within Monash University's Faculty of Pharmacy and Pharmaceutical Sciences.

Phase 1: Pre-design

- Planetary Health Education Champions (5 undergraduate pharmacy students and 5 staff members) created and embedded planetary health material within the 3rd year pharmacy curriculum.
- Material developed included a recorded video lecture, 2 hours of pre-reading material, a 2 hour workshop and an end of semester exam question. The content covered appropriate pharmaceutical waste disposal, the human health impacts of climate change, AMR and AMS.

Phase 2: Generative

- The materials were reviewed by planetary health and AMS experts.
- The curriculum was delivered to third year pharmacy students enrolled in Australia (n = 317) and Malaysia (n = 81) over one week in 2024 as part of the infectious diseases general curriculum.

Phase 3: Evaluate

- The PHE Champions collected pre and post implementation surveys. The post survey asked the question "What are some key takeaways messages you've learnt from the workshop and what practices would you aim to incorporate in your future practice?"
- A mix of individual and group semi-structured reflection interviews were conducted with students who opted to provide feedback upon completion of the activities.
- A short 4 mark final exam 2 part exam question "What advice would you give a consumer who had left over antibiotic syrup at home?" AND "Whilst the second planetary health exam question asked the students: How would you explain planetary health to a consumer?"

Phase 4: Post design

- The PHE Champions came back together to reflect and discuss their experience with the implementation process, documenting aspects that were well-received by students and those that required improvement.

Data analysis and collection

Final exam, post-survey and interview responses were analyzed deductively according to the PHE Framework's five domains. An additional thematic analysis of the interview data was also conducted, guided by Fredricks *et al* Three Dimensional Engagement Model⁴.



Figure 2. Photographs of PHE Champions during the co-design workshops.

RESULTS

Students' mean final examination score for planetary health-related questions was 85.6% (SD 2.4) for Australia and 80.3% (SD 2.9) for Malaysia. Final exam responses reveal the concepts most retained were in the domains of 'Equity and Social Justice' and 'Movement Building and Systems Change'. Post-curriculum surveys found the highest engagement in the domains of 'The Anthropocene and Health' and 'Movement Building and Systems Change', with peak engagement in the subdomains of 'Ecological footprint' (84.2% for Australia, 90.0% for Malaysia) and 'Empowerment, autonomy and agency' (86.4% for Australia, 100.0% for Malaysia). Post-curriculum interviews indicated that students overwhelmingly felt positively towards the activities, and exhibited an improved appreciation for key planetary health concepts.

Figure 3. Parkville and Malaysian student responses to the post-curriculum survey relating to the domains and subdomains of the Planetary Health Education Framework³.

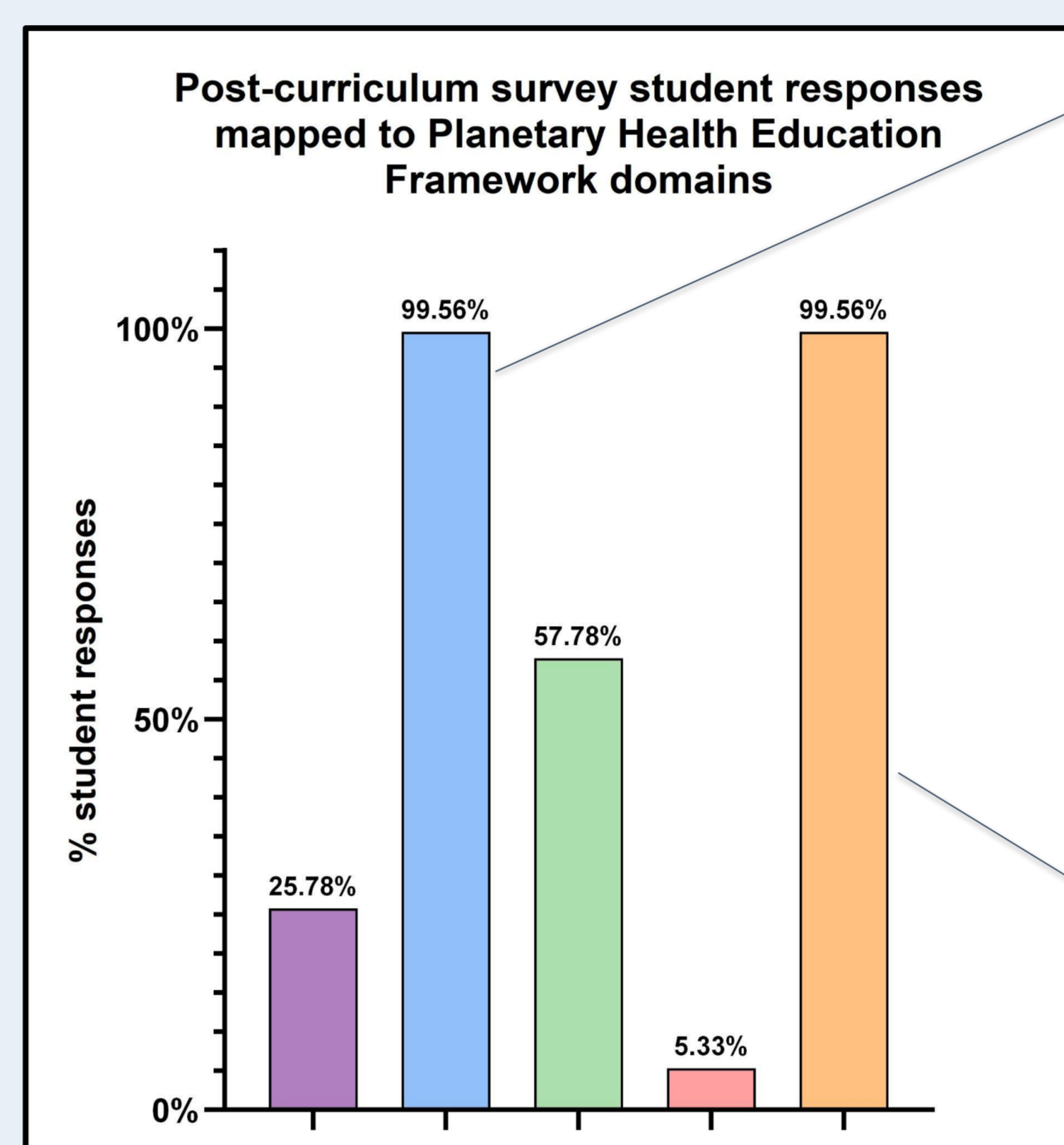


Figure 4. Parkville student responses in the post-curriculum interview relating to the pillars of the Three Dimensional Engagement Model.⁴

Student interview answers mapped to Fredricks three dimensional Engagement Model



60% Of interview answers related to the Movement building and systems change aspect of Lancel's framework

49% Of Parkville students engaged cognitively with sustainability materials

19% Of Parkville students demonstrated behavioral engagement after interacting with materials

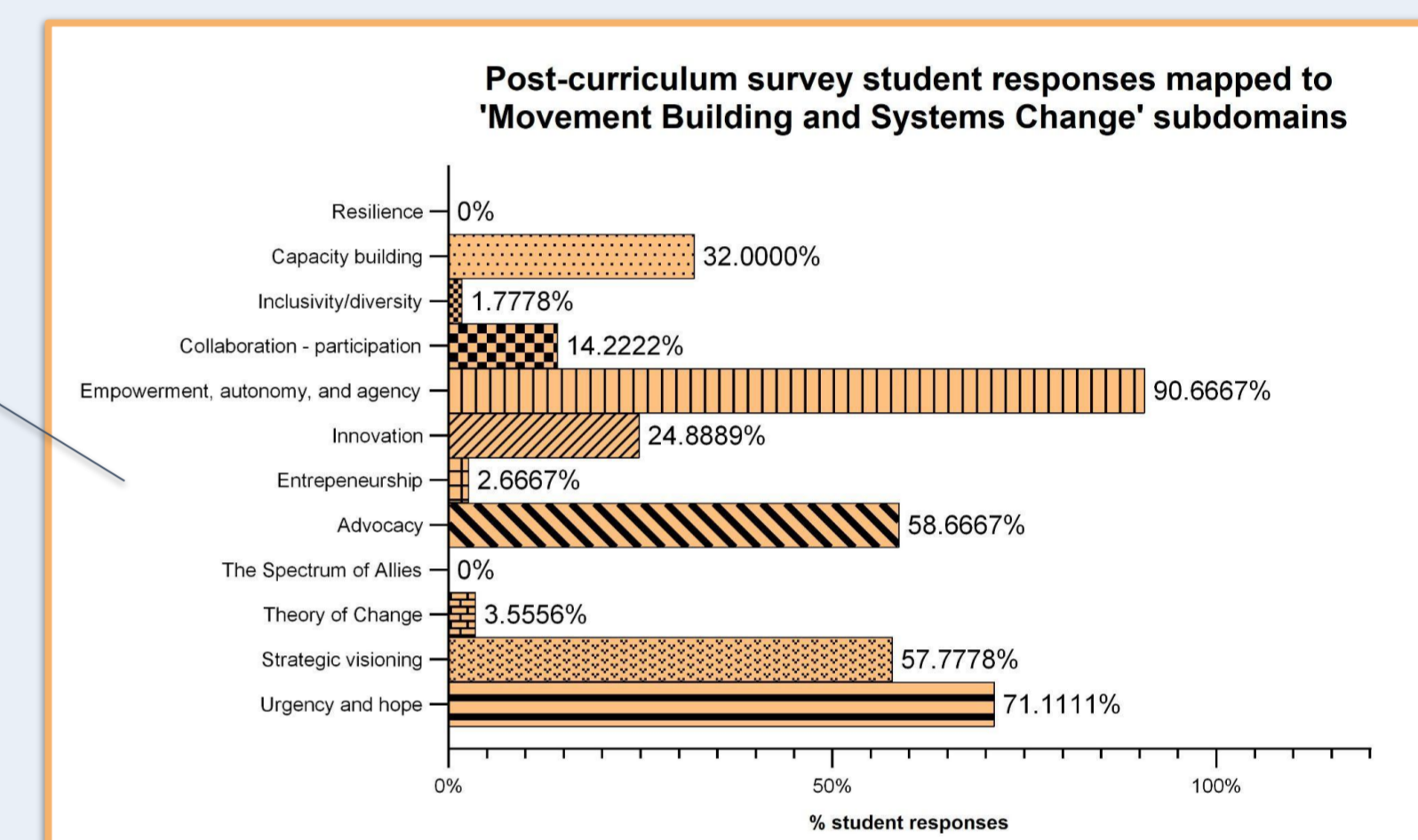
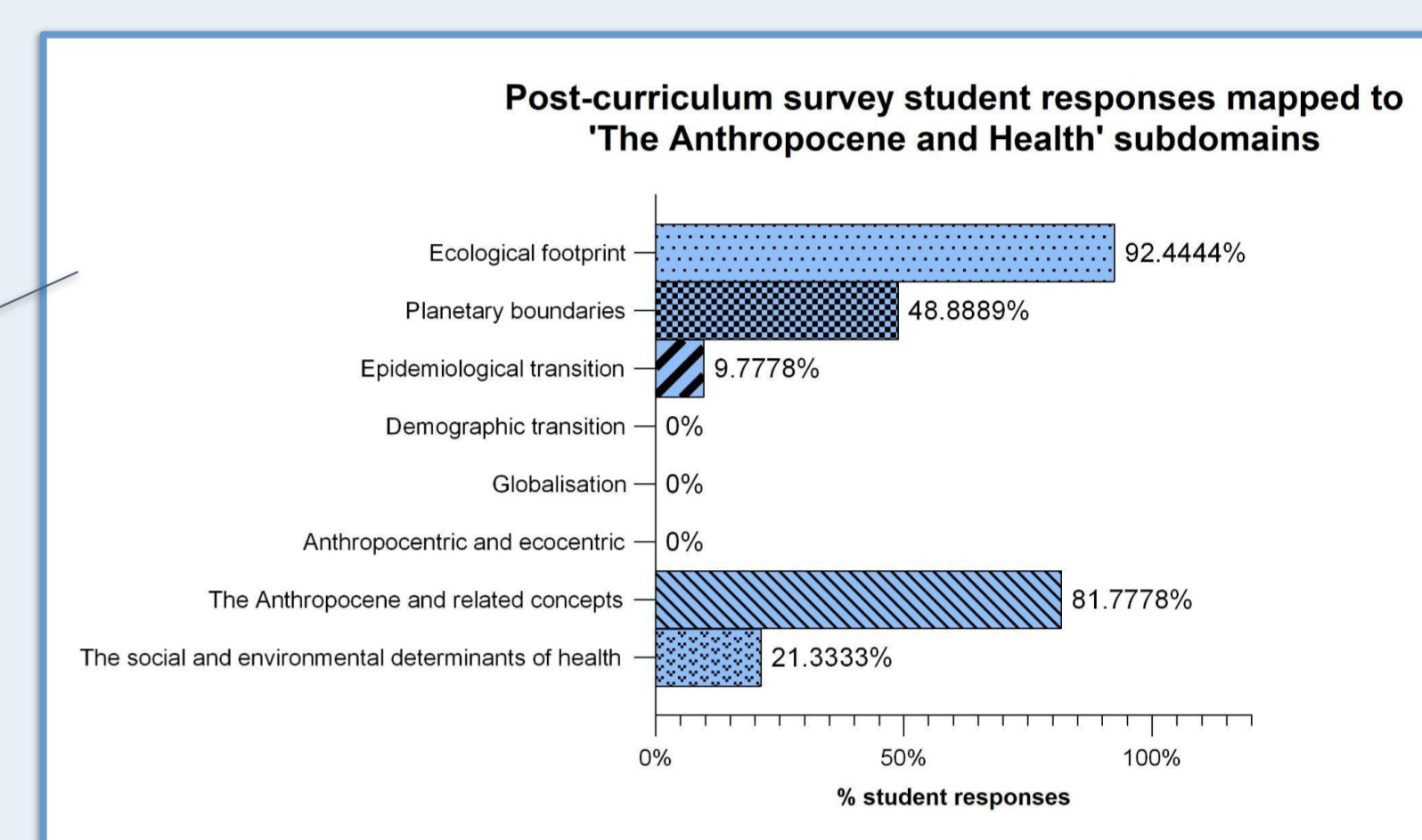
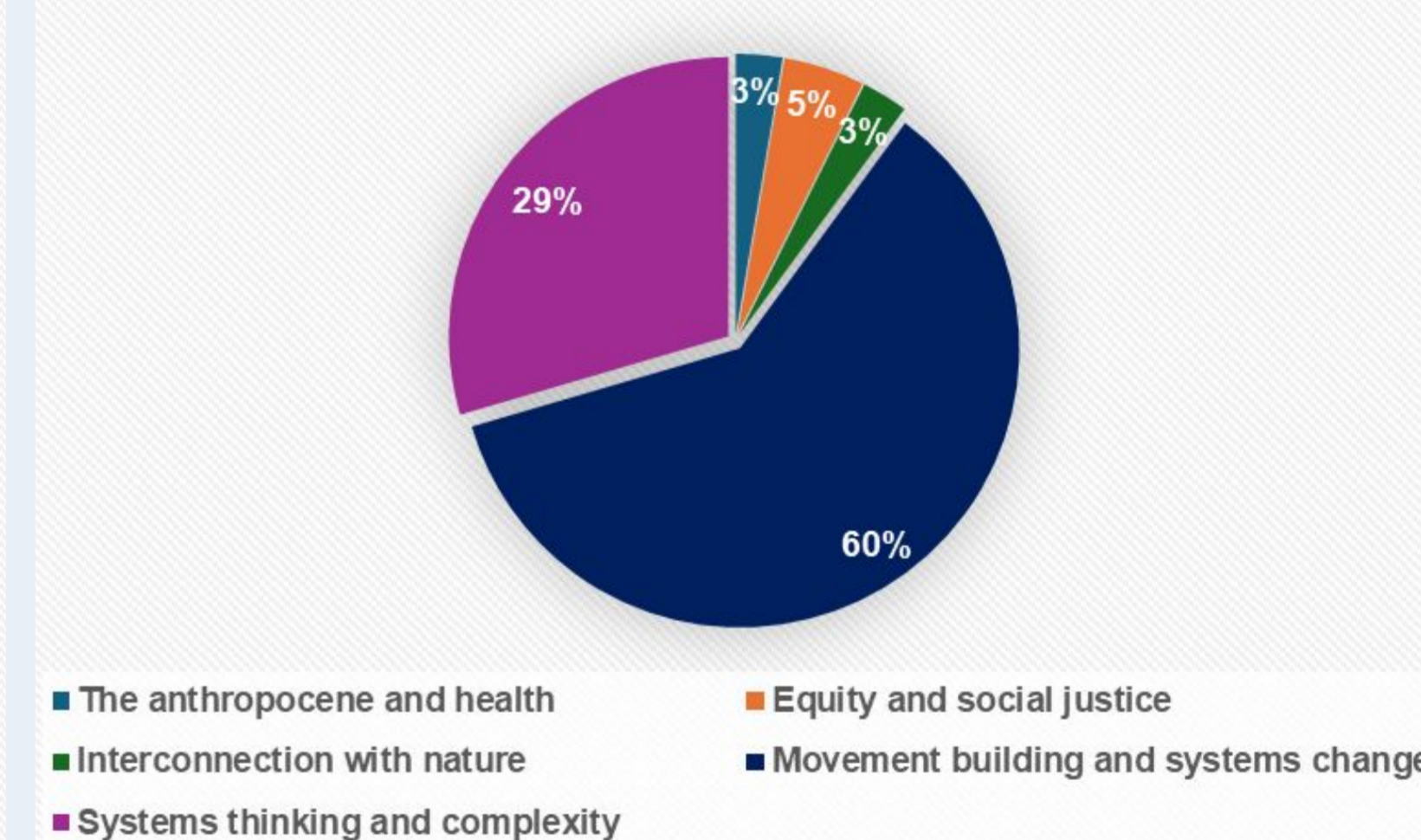


Figure 5. Parkville student responses in the post-curriculum interview relating to the domains of the Planetary Health Education Framework.³

Student interview answers mapped to Lancel's Planetary Health Education Framework



DISCUSSION + CONCLUSION

The implementation of planetary health curricula was shown to enhance understanding of the ecological impact of the health system and inspire agency and action in daily practice in the context of infectious diseases. Peak student engagement was consistently demonstrated in the domain of 'Movement Building and Systems Change' across both post-curriculum surveys, interviews and the final examination, with particular emphasis on the 'Empowerment, Autonomy and Agency' subdomain. This suggests the curricula effectively resonated with students' aspirations to enact meaningful change through their future pharmacy practice, reflecting alignment with the transformative and solutions-focused goals of PHE.

Analogous student-led programs have been implemented in the United States and Germany, with the German program reporting high demand and positive evaluations, further supporting our similarly designed "bottom-up" approach^{5,6}. Such programs have been shown to reduce the sense of helplessness students experience when discussing climate change and other planetary health-related issues, and increase motivation to take action⁷. Future research should continue the ongoing development and implementation of student-led planetary health education programs into tertiary health care curricula, to instill sustainable practice habits in future health professionals.

References

- World Health Organisation. Ten threats to global health in 2019.
- Gepp S et al. The Lancet Planetary Health. 2023
- Guzman et al. Planetary Health Alliance, 2021
- Fredricks JA et al. Rev Educ Res. 2004
- Fülbert H et al. J Med Educ. 2023;40(3):Doc34.
- Navarrete-Welton et al. Front Public Health. 2022
- Schwiehorst-Stich et al. The Lancet Planetary Health. 2024

Funding

This project was part of a Faculty-wide Education Fellowship (Planetary Health) funded by the Office of the Deputy Dean Education, Faculty of Medicine, Nursing and Health Sciences